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TRANSACTIONS

OF THE

AMERICAN DENTAL ASSOCIATION

AT THE

THIRTY-FIRST ANNUAL SESSION,

HELD AT

SARATOGA SPRINGS, N. Y.

COMMENCING ON THE 4th OF AUGUST, 1891.

PUBLICATION COMMITTEE:

GEO. H. CUSHING. E. T. DARBY. A. W. HARLAN.

PHILADELPHIA:
THE S. S. WHITE DENTAL MANUFACTURING CO.
1891.

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PRESS OF PATTERSON & WHITE,
PHILADELPHIA.

LIST OF OFFICERS FROM DATE OF ORGANIZATION.

PRELIMINARY CONVENTION, NIAGARA FALLS, AUGUST, 1859.

President,	W. W. ALLPORT . . .	Chicago, Ill.
Secretary,	J. TAFT	Cincinnati, Ohio.

ORGANIZATION AND FIRST SESSION OF ASSOCIATION, WASHINGTON, D. C., JULY, 1860.

[Annual meetings to be hereafter, last Tuesday in July.]

President,	W. H. ATKINSON . . .	Cleveland, Ohio.
1st Vice-President,	J. B. GIBBS . . .	Washington, D. C.
2d Vice-President,	W. CAHOON	Detroit, Mich.
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Corresponding Secretary,	W. MUIR ROGERS . . .	Shelbyville, Ky.
Treasurer,	S. DILLINGHAM . . .	Philadelphia, Pa.

[NO MEETING IN 1861.]

CLEVELAND, JULY, 1862.

President,	GEO. WATT	Xenia, Ohio.
1st Vice-President,	W. H. ALLEN . . .	New York City.
2d Vice-President,	W. D. STONE	Lexington, Ky.
Recording Secretary,	J. TAFT	Cincinnati, Ohio.
Corresponding Secretary,	J. F. JOHNSTON . . .	Indianapolis, Ind.
Treasurer,	W. A. PEASE	Dayton, Ohio.

PHILADELPHIA, JULY, 1863.

President,	W. H. ALLEN . . .	New York City.
1st Vice-President,	J. H. MCQUILLEN . . .	Philadelphia, Pa.
2d Vice-President,	WM. B. HURD . . .	Brooklyn, N. Y.
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Corresponding Secretary,	C. R. BUTLER . . .	Cleveland, Ohio.
Treasurer,	A. C. HAWES	New York City.

NIAGARA FALLS, JULY, 1864.

President,	J. H. MCQUILLEN . . .	Philadelphia, Pa.
1st Vice-President,	C. P. FITCH	New York City.
2d Vice-President,	H. BENEDICT	Detroit, Mich.
Recording Secretary,	J. TAFT	Cincinnati, Ohio.
Corresponding Secretary,	GEO. W. ELLIS . . .	Philadelphia, Pa.
Treasurer,	I. J. WETHERBEE . . .	Boston, Mass.

CHICAGO, JULY, 1865.

President,	C. W. SPALDING	St. Louis, Mo.
1st Vice-President,	GEO. H. CUSHING	Chicago, Ill.
2d Vice-President,	JAS. MCMANUS	Hartford, Conn.
Recording Secretary,	J. TAFT	Cincinnati, Ohio.
Corresponding Secretary,	L. D. SHEPARD	Boston, Mass.
Treasurer,	I. J. WETHERBEE	Boston, Mass.

BOSTON, JULY, 1866.

President,	C. P. FITCH	New York City.
1st Vice-President,	W. H. MORGAN	Nashville, Tenn.
2d Vice-President,	L. D. SHEPARD	Boston, Mass.
Recording Secretary,	J. TAFT	Cincinnati, Ohio.
Corresponding Secretary,	A. HILL	Norwalk, Conn.
Treasurer,	W. W. SHEFFIELD	New London, Conn.

CINCINNATI, JULY, 1867.

President,	A. LAWRENCE	Lowell, Mass.
1st Vice-President,	P. G. C. HUNT	Indianapolis, Ind.
2d Vice-President,	A. S. TALBERT	Lexington, Ky.
Recording Secretary,	J. TAFT	Cincinnati, Ohio.
Corresponding Secretary,	C. R. BUTLER	Cleveland, Ohio.
Treasurer,	W. H. GODDARD	Louisville, Ky.

NIAGARA FALLS, JULY, 1868.

President,	JONATHAN TAFT	Cincinnati, Ohio.
1st Vice-President,	HOMER JUDD	St. Louis, Mo.
2d Vice-President,	A. A. BLOUNT	Springfield, Ohio.
Recording Secretary,	EDGAR PARK	St. Louis, Mo.
Corresponding Secretary,	JAS. MCMANUS	Hartford, Conn.
Treasurer,	W. H. GODDARD	Louisville, Ky.

SARATOGA SPRINGS, AUGUST, 1869.*

President,	HOMER JUDD	St. Louis, Mo.
1st Vice-President,	S. J. COBB	Nashville, Tenn.
2d Vice-President,	C. E. FRANCIS	New York City.
Recording Secretary,	M. S. DEAN	Chicago, Ill.
Corresponding Secretary,	I. A. SALMON	Boston, Mass.
Treasurer,	W. H. GODDARD	Louisville, Ky.

NASHVILLE, AUGUST, 1870.

President,	W. H. MORGAN	Nashville, Tenn.
1st Vice-President,	S. W. DENNIS	San Francisco, Cal.
2d Vice-President,	J. R. WALKER	New Orleans, La.
Recording Secretary,	M. S. DEAN	Chicago, Ill.
Corresponding Secretary,	I. A. SALMON	Boston, Mass.
Treasurer,	W. H. GODDARD	Louisville, Ky.

*Owing to a change in the Constitution, officers elected at this and the sessions following served at the next annual meeting subsequent to their election; and the sessions of and after 1869 commenced on the first Tuesday in August.

WHITE SULPHUR SPRINGS, VA., AUGUST, 1871.

President,	GEO. H. CUSHING . . .	Chicago, Ill.
1st Vice-President,	C. E. FRANCIS . . .	New York City
2d Vice-President,	J. R. WALKER . . .	New Orleans, La
Recording Secretary,	M. S. DEAN	Chicago, Ill.
Corresponding Secretary,	I. A. SALMON . . .	Boston, Mass.
Treasurer,	W. H. GODDARD . . .	Louisville, Ky.

NIAGARA FALLS, AUGUST, 1872.

President,	P. G. C. HUNT . . .	Indianapolis, Ind
1st Vice-President,	L. D. SHEPARD . . .	Boston, Mass.
2d Vice-President,	G. A. MILLS	Brooklyn, N. Y.
Recording Secretary,	M. S. DEAN	Chicago, Ill.
Corresponding Secretary,	J. TAFT	Cincinnati, Ohio.
Treasurer,	W. H. GODDARD . . .	Louisville, Ky.

PUT-IN-BAY, AUGUST, 1873.

President,	T. L. BUCKINGHAM . .	Philadelphia, Pa
1st Vice-President,	ISAIAH FORBES . . .	St. Louis, Mo.
2d Vice-President,	A. F. MCLAIN . . .	New Orleans, La.
Recording Secretary,	M. S. DEAN	Chicago, Ill.
Corresponding Secretary,	J. TAFT	Cincinnati, Ohio.
Treasurer,	W. H. GODDARD . . .	Louisville, Ky.

DETROIT, AUGUST, 1874.

President,	M. S. DEAN	Chicago, Ill.
1st Vice-President,	GEO. W. KEELY . . .	Oxford, Ohio.
2d Vice-President,	J. S. KNAPP	New Orleans, La.
Recording Secretary,	C. STODDARD SMITH . .	Springfield, Ill.
Corresponding Secretary,	GEO. L. FIELD . . .	Detroit, Mich.
Treasurer,	W. H. GODDARD . . .	Louisville, Ky.

NIAGARA FALLS, AUGUST, 1875.

President,	A. L. NORTHROP . . .	New York City.
1st Vice-President,	H. J. MCKELLOPS . . .	St. Louis, Mo.
2d Vice-President,	H. A. SMITH	Cincinnati, Ohio.
Recording Secretary,	C. STODDARD SMITH . .	Springfield, Ill.
Corresponding Secretary,	J. H. MCQUILLEN . . .	Philadelphia, Pa.
Treasurer,	W. H. GODDARD . . .	Louisville, Ky.

PHILADELPHIA, AUGUST, 1876.

President,	GEO. W. KEELY . . .	Oxford, Ohio.
1st Vice-President,	C. N. PEIRCE	Philadelphia, Pa.
2d Vice-President,	CORYDON PALMER . .	New York City.
Recording Secretary,	C. STODDARD SMITH . .	Springfield, Ill.
Corresponding Secretary,	J. H. MCQUILLEN . . .	Philadelphia, Pa.
Treasurer,	W. H. GODDARD . . .	Louisville, Ky.

CHICAGO, AUGUST, 1877.

President,	F. H. REHWINKEL	Chillicothe, Ohio.
1st Vice-President,	L. D. SHEPARD	Boston, Mass.
2d Vice-President,	GEO. T. BARKER	Philadelphia, Pa.
Recording Secretary,	M. S. DEAN	Chicago, Ill.
Corresponding Secretary,	M. H. WEBB	Lancaster, Pa.
Treasurer,	W. H. GODDARD	Louisville, Ky.

NIAGARA FALLS, AUGUST, 1878.

President,	H. J. MCKELLOPS	St. Louis, Mo.
1st Vice-President,	L. D. SHEPARD	Boston, Mass.
2d Vice-President,	L. D. CARPENTER	Atlanta, Ga.
Recording Secretary,	GEO. H. CUSHING	Chicago, Ill.
Corresponding Secretary,	A. O. RAWLS	Lexington, Ky.
Treasurer,	W. H. GODDARD	Louisville, Ky.

NIAGARA FALLS, AUGUST, 1879.

President,	L. D. SHEPARD	Boston, Mass.
1st Vice-President,	C. N. PEIRCE	Philadelphia, Pa.
2d Vice-President,	GEO. L. FIELD	Detroit, Mich.
Recording Secretary,	GEO. H. CUSHING	Chicago, Ill.
Corresponding Secretary,	M. H. WEBB	Lancaster, Pa.
Treasurer,	W. H. GODDARD	Louisville, Ky.

BOSTON, AUGUST, 1880.

President,	C. N. PEIRCE	Philadelphia, Pa.
1st Vice-President,	W. C. BARRETT	Buffalo, N. Y.
2d Vice-President,	GEO. J. FRIEDRICHS	New Orleans, La.
Recording Secretary,	GEO. H. CUSHING	Chicago, Ill.
Corresponding Secretary,	A. M. DUDLEY	Salem, Mass.
Treasurer,	W. H. GODDARD	Louisville, Ky.

NEW YORK, JULY, 1881.

President,	H. A. SMITH	Cincinnati, Ohio.
1st Vice-President,	W. C. BARRETT	Buffalo, N. Y.
2d Vice-President,	GEO. J. FRIEDRICHS	New Orleans, La.
Recording Secretary,	GEO. H. CUSHING	Chicago, Ill.
Corresponding Secretary,	A. M. DUDLEY	Salem, Mass.
Treasurer,	W. H. GODDARD	Louisville, Ky.

CINCINNATI, AUGUST, 1882.

President,	W. H. GODDARD	Louisville, Ky.
1st Vice-President,	GEO. J. FRIEDRICHS	New Orleans, La.
2d Vice-President,	E. T. DARBY	Philadelphia, Pa.
Recording Secretary,	GEO. H. CUSHING	Chicago, Ill.
Corresponding Secretary,	A. W. HARLAN	Chicago, Ill.
Treasurer,	GEO. W. KEELY	Oxford, Ohio.

NIAGARA FALLS, AUGUST, 1883.

President,	E. T. DARBY	Philadelphia, Pa
1st Vice-President,	C. S. STOCKTON	Newark, N. J.
2d Vice-President,	T. T. MOORE	Columbia, S. C.
Recording Secretary,	GEO. H. CUSHING	Chicago, Ill.
Corresponding Secretary,	A. W. HARLAN	Chicago, Ill.
Treasurer,	GEO. W. KEELY	Oxford, Ohio.

SARATOGA SPRINGS, AUGUST, 1884.

President,	J. N. CROUSE	Chicago, Ill.
1st Vice-President,	M. W. FOSTER	Baltimore, Md.
2d Vice-President,	C. F. RICH	Saratoga, N. Y
Recording Secretary,	GEO. H. CUSHING	Chicago, Ill.
Corresponding Secretary,	A. W. HARLAN	Chicago, Ill.
Treasurer,	GEO. W. KEELY	Oxford, Ohio.

MINNEAPOLIS, AUGUST, 1885.

President,	W. C. BARRETT	Buffalo, N. Y.
1st Vice-President,	L. C. INGERSOLL	Keokuk, Iowa.
2d Vice-President,	A. T. SMITH	Minneapolis, Minn.
Recording Secretary,	GEO. H. CUSHING	Chicago, Ill.
Corresponding Secretary,	A. W. HARLAN	Chicago, Ill.
Treasurer,	GEO. W. KEELY	Oxford, Ohio.

NIAGARA FALLS, 1886.

President,	W. W. ALLPORT	Chicago, Ill.
1st Vice-President,	GEO. W. MCELHANEY	Columbus, Ga.
2d Vice-President,	S. W. DENNIS	San Francisco, Cal.
Recording Secretary,	GEO. H. CUSHING	Chicago, Ill.
Corresponding Secretary,	A. W. HARLAN	Chicago, Ill.
Treasurer,	GEO. W. KEELY	Oxford, Ohio.

NIAGARA FALLS, 1887.

President,	FRANK ABBOTT	New York City.
1st Vice-President,	CHARLES R. BUTLER	Cleveland, Ohio.
2d Vice-President,	T. SOLLERS WATERS	Baltimore, Md.
Recording Secretary,	GEO. H. CUSHING	Chicago, Ill.
Corresponding Secretary,	FRED. A. LEVY	Orange, N. J.
Treasurer,	GEO. W. KEELY	Oxford, Ohio.

LOUISVILLE, KY., 1888.

President,	C. R. BUTLER	Cleveland, Ohio
1st Vice-President,	A. W. HARLAN	Chicago, Ill.
2d Vice-President,	SAMUEL A. WHITE	Savannah, Ga.
Recording Secretary,	GEO. H. CUSHING	Chicago, Ill.
Corresponding Secretary,	FRED. A. LEVY	Orange, N. J.
Treasurer,	A. H. FULLER	St. Louis, Mo.

SARATOGA SPRINGS, 1889.

President,	M. W. FOSTER . . .	Baltimore, Md.
1st Vice-President,	A. W. HARLAN . . .	Chicago, Ill.
2d Vice-President,	J. D. PATTERSON . . .	Kansas City, Mo.
Recording Secretary,	GEO. H. CUSHING . .	Chicago, Ill.
Corresponding Secretary,	FRED. A. LEVY . . .	Orange, N. J.
Treasurer,	A. H. FULLER . . .	St. Louis, Mo.

EXCELSIOR SPRINGS, MO., 1890.

President,	A. W. HARLAN . . .	Chicago, Ill.
1st Vice-President,	J. D. PATTERSON . . .	Kansas City, Mo.
2d Vice-President,	H. B. NOBLE . . .	Washington, D. C.
Recording Secretary,	GEO. H. CUSHING . .	Chicago, Ill.
Corresponding Secretary,	FRED. A. LEVY . . .	Orange, N. J.
Treasurer,	A. H. FULLER . . .	St. Louis, Mo.

SARATOGA SPRINGS, 1891.

President,	W. W. WALKER . . .	New York City.
1st Vice-President,	J. D. PATTERSON . . .	Kansas City, Mo.
2d Vice-President,	S. C. G. WATKINS . . .	Mont Clair, N. J.
Recording Secretary,	GEO. H. CUSHING . .	Chicago, Ill.
Corresponding Secretary,	FRED. A. LEVY . . .	Orange, N. J.
Treasurer,	A. H. FULLER . . .	St. Louis, Mo.

EXECUTIVE COMMITTEE FOR SESSION OF 1892.

J. N. CROUSE, Chairman. C. N. PEIRCE, Secretary.

FIRST DIVISION—COMMITTEE OF ARRANGEMENTS.

J. N. CROUSE. *W. W. WALKER. L. D. SHEPARD.

SECOND DIVISION—ON CREDENTIALS, ETHICS, AND AUDITING ACCOUNTS.

H. A. SMITH. G. W. MCELHANEY. V. H. JACKSON.

THIRD DIVISION—ON VOLUNTARY ESSAYS.

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* These go out August, 1892.

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MINUTES OF TRANSACTIONS

OF THE

AMERICAN DENTAL ASSOCIATION,

SESSION OF 1891.

BY GEORGE H. CUSHING, SECRETARY.

GEORGE EVANS,
49 West 39th St., N. Y. City,

FIRST DAY—MORNING SESSION.

THE AMERICAN DENTAL ASSOCIATION commenced its Thirty-first Annual Session in the Court Chambers at Saratoga Springs, N. Y., on Tuesday, August 4, 1891, at 11 A.M., the President, A. W. Harlan, in the chair.

The roll was called, and the following were found either to be present or to have forwarded their dues:

ABBOTT, FRANK	22 West Fortieth st., New York.
AMES, W. B.	70 State st., Chicago, Ill.
ATKINSON, CHAS. B.	41 East Ninth st., New York.
BROWN, S. B.	Fort Wayne, Ind.
BARRETT, W. C.	208 Franklin st., Buffalo, N. Y.
BUTLER, C. R.	519 Euclid ave., Cleveland, O.
*BAIRD, W. H.	Burlington, Ia.
BISHOP, J. ADAMS	30 West Forty-eighth st., New York.
*BOGUE, E. A.	29 East Twentieth st., New York.
BOICE, ALONZO	1612 Vine st., Philadelphia, Pa.
*BRACKETT, C. A.	102 Touro st., Newport, R. I.
BROPHY, TRUMAN W.	96 State st., Chicago, Ill.
*BALDWIN, A. E.	828 West Adams st., Chicago, Ill.
*BROWN, A. E.	1536 Wabash ave., Chicago, Ill.
BROWN, E. PARMLY	716 Fifth ave., New York.
CUSHING, GEORGE H.	96 State st., Chicago, Ill.
CROUSE, J. N.	2231 Prairie ave., Chicago, Ill.

* Those marked thus were not present, but sent their dues.
d Those marked thus were delegates, but not permanent members.

*Chaim, M. L.	30 Cooper Institute, New York.
*Cook, C. D.	133 Pacific st., Brooklyn, N. Y.
*Clapp, Dwight M.	62 Trinity Terrace, Boston, Mass.
*Conrad, Wm.	321 North Grand ave., St. Louis, Mo.
Custer, Levitt E.	Dayton, O.
Curtis, G. Lenox	11 East Jefferson st., Syracuse, N. Y.
*Chittenden, C. C.	21 West Main st., Madison, Wis.
*Colding, Henry S.	105 Jones st., Savannah, Ga.
Cravens, J. E.	Indianapolis, Ind.
Crawford, J. Y.	Nashville, Tenn.
*Cassidy, J S.	Covington, Ky.
*Chase, Emma E.	2602 Locust st., St. Louis, Mo.
Culver, M. B.	115 South Seventeenth st., Philadelphia, Pa.
Carroll, C. C.	119 Fifth ave., New York.
*Darby, Edwin T.	1513 Walnut st., Philadelphia, Pa.
*Douglass, B.	Appleton, Wis.
Dwinelle, W. H.	41 West Thirty-fourth st., New York.
*Davenport, I. B.	30 Ave. de l'Opéra, Paris, France.
*Doyle, B. Oscar	735 West Jefferson st., Louisville, Ky.
Daboll, G. C.	Paris, France.
Evans, George	133 West Thirty-fourth st., New York.
Eames, W. H.	2602 Locust st., St. Louis, Mo.
Farrar, J. N.	1271 Broadway, cor. Thirty-second st., New York.
Freeman, A. W.	112 Clark st., Chicago, Ill.
*Fundenberg, W. H.	958 Penn ave., Pittsburgh, Pa.
Finley, M. F.	1928 I st., Washington, D. C.
*Field, Geo. L.	Abstract Building, Detroit, Mich.
*Freeman, S. A.	641 Main st., Buffalo, N. Y.
Friedrichs, Geo. J.	155 St. Charles st., New Orleans, La.
Fillebrown, Thos.	609 Congress st., Portland, Me.
Fuller, A. H.	2602 Locust st., St. Louis, Mo.
*Fundenberg, W. F.	958 Penn ave., Pittsburgh, Pa.
*Freeman, S.	1109 Lexington ave., New York.
Floyd, E. A.	Paola, Kas.
Friedrichs, A. G.	155 St. Charles st., New Orleans, La.
*Freeman, Arthur B.	325 West Madison st., Chicago, Ill.
Gaylord, Edward S.	632 Chapel st., New Haven, Conn.
Guilford, S. H.	1616 Walnut st., Philadelphia, Pa.
*Gilmer, T. L.	3266 Cottage Grove ave., Chicago, Ill.
*Goddard, C. L.	131 Post st., San Francisco, Cal.
*Griswold, W. E.	Tabor Opera House, Denver, Col.
Gaskill, J. Howard	1313 Arch st., Philadelphia, Pa.
*Harroun, C. H.	223 Summit st., Toledo, O.
Hoysradt, G. W.	Ithaca, N. Y.
Harlan, A. W.	70 Dearborn st., Chicago, Ill.
*Hunt, P. G. C.	143 North Pennsylvania st., Indianapolis, Ind.

Hoff, N. S.	Ann Arbor, Mich.
*How, W. Storer	Chestnut st., cor. Twelfth, Philadelphia, Pa.
Hetrick, F. O.	Ottawa, Kas.
*Hacker, T. S.	28½ East Ohio st., Indianapolis, Ind.
Hunt, A. O.	Iowa City, Ia.
*Hawes, Earl P.	88 Westminster st., Providence, R. I.
Horton, W. P.	177 Euclid ave., Cleveland, O.
*Hayward, T. T.	2017 Fourth ave., Minneapolis, Minn.
Hewitt, C. B.	718 Troost ave., Kansas City, Mo.
Hodgkin, James B.	906 Fifteenth st., N. W., Washington, D. C.
Hunt, Geo. Edwin	143 North Pennsylvania st., Indianapolis, Ind.
Harvey, H. F.	44 Euclid ave., Cleveland, O.
Ingersoll, L. C.	Keokuk, Ia.
*Jackson, H. H.	317 Jefferson ave., Detroit, Mich.
Johnson, C. N.	Opera House, Chicago, Ill., Room 612.
Jackson, V. H.	240 Lenox ave., New York.
*Jefferis, C. R.	908 King st , Wilmington, Del.
Jack, Louis	1533 Locust st., Philadelphia, Pa.
Johnston, S. E.	Seneca, Kas.
Jones, Victor S	Bethlehem, Pa.
Kirk, Edward C.	1807 Chestnut st., Philadelphia, Pa.
*Knowles, Samuel E.	S. E. cor. Post and Stockton sts., San Francisco, Cal.
*Keith, H. H.	3140 Olive st., St. Louis, Mo.
Kelley, D. E.	Ashtabula, O.
Knapp, J. Rollo	102 Canal st., New Orleans, La.
King, H. T.	Fremont, Neb.
*Litch, Wilbur F.	1507 Walnut st., Philadelphia, Pa.
*Lathrop, Joseph	271 Woodward ave., Detroit, Mich.
Luckey, B. F.	Paterson, N. J.
Levy, Fred A.	343 Main st., Orange, N. J.
Lowry, H. S.	1106 Main st., Kansas City, Mo.
*Letord, J. S.	548 Main st., Kansas City, Mo.
LeRoy, Louis C.	226 Fifth st., New York.
d Lewis, James	Burlington, Vt.
*Morgan, Henry W.	211 North High st., Nashville, Tenn.
*Morrison, W. N.	1401 Washington ave., St. Louis, Mo.
Morgan, W. H.	211 North High st., Nashville, Tenn.
*Maercklein, B. G.	Iron Block, Milwaukee, Wis.
*Meng, Jno. W.	Lexington, Mo.
Marshall, John S.	Argyle Building, Chicago, Ill.
*Maercklein, Robt.	Iron Block, Milwaukee, Wis.
*Monfort, J. B.	Fairfield, Ia.
Mollyneaux, Grant	S. E. cor. Seventh and Elm sts., Cincinnati, O.

*Moore, J. Hall	104 North Ninth st., Richmond, Va.
*McManus, James	32 Pratt st., Hartford, Conn.
McKellops, H. J.	2630 Washington ave., St. Louis, Mo.
McCandless, A. W.	118 West Third st., Davenport, Ia.
McElhaney, G. W.	1147½ Broad st., Columbus, Ga.
Noble, H. B.	600 Thirteenth st., cor. F, Washington, D. C.
Northrop, A. L.	57 West Forty-ninth st., New York.
*Noyes, Edmund	65 Randolph st., Chicago, Ill.
Newby, J. B.	2640 Washington ave., St. Louis, Mo.
*Odell, F. M.	159 West Thirty-fourth st., New York.
Ottofy, Louis	70 Dearborn st., Chicago, Ill.
Peirce, C. N.	1415 Walnut st., Philadelphia, Pa.
*Palmer, Stewart B.	39½ Warren st., Syracuse, N. Y.
Patrick, J. J. R.	Belleville, Ill.
Priest, A. N.	286 Genesee st., Utica, N. Y.
*Page, W. E.	Room 11, Studio Building, Boston, Mass.
Patterson, J. D.	800 Main st., Kansas City, Mo.
*Palmer, J. W.	Fitchburg, Mass.
Palmer, Corydon	Warren, O.
*Peabody, Francis	301 West Chestnut st., Louisville, Ky.
*Perry, S. G.	46 West Thirty-seventh st., New York.
Rhein, Meyer L.	104 East Fifty-eighth st., New York.
*Roberts, Norman J.	Waukegan, Ill.
Root, Geo. F.	2112 Mt. Vernon st., Philadelphia, Pa.
Rich, Jno. B.	619 Fourteenth st., N. W., Washington, D. C.
Richards, Wm. P.	Box 477, Orange, N. J.
*Remington, F. A.	57 West Forty-ninth st., New York.
Smith, H. A.	128 Garfield Place, Cincinnati, O.
Shepard, L. D.	330 Dartmouth st., cor. Beacon, Boston, Mass.
*Smith, Eugene H.	283 Dartmouth st., Boston, Mass.
Stockton, C. S.	15 Cedar st., Newark, N. J.
*Stephens, B. Q.	Hannibal, Mo.
*Shryock, W. W.	27 West Berry st., Fort Wayne, Ind.
*Sibley, A. H.	800 North Sixteenth st., Philadelphia, Pa.
*Smith, Marvin E.	163 State st., Chicago, Ill.
Smith, J. H.	250 York st., New Haven, Conn.
*Smith, P. T.	Tabor Opera House, Denver, Col.
Shattuck, E. E.	1100 Main st., Kansas City, Mo.
Stubblefield, D. R.	Nashville, Tenn.
*Shulze, Wm. H.	Atchison, Kas.
Stebbins, E. A.	Shelburne Falls, Mass.
Sanger, R. M.	557 Main st., East Orange, N. J.
Sill, Charles	301 West Twelfth st., New York.

SMITH, DWIGHT	3 East Forty-seventh st., New York.
*SWAIN, E. D.	65 Randolph st., Chicago, Ill.
*STARR, A. R.	164 East Ninety-first st., New York.
SUDDUTH, W. XAVIER	Sixth st. and Ninth ave. South, Minneapolis, Minn.
TAFT, J.	122 West Seventh st., Cincinnati, O.
TALBOT, EUGENE S.	125 State st., Chicago, Ill.
TRUMAN, JAMES	3243 Chestnut st., West Phila., Pa.
TIMME, C. A.	190 Hudson st., Hoboken, N. J.
TAYLOR, L. C.	26 Pratt st., Hartford, Conn.
VAN VLECK, CHAS. K.	536 Warren st., Hudson, N. Y.
VOLCK, A. J.	338 North Charles st., Baltimore, Md.
*WASSALL, J. W.	208 Dearborn ave., Chicago, Ill.
WATERS, GEO. F.	6 Somerset st., Boston, Mass.
WILSON, I. P.	317 North Fourth st., Burlington, Ia.
WATKINS, S. C. G.	Mont Clair, N. J.
WALKER, WM. WALLACE	67 West Ninth st., New York.
*WATERS, T. S.	Baltimore, Md.
*WHITSLAR, W. H.	265 West Boardman st., Youngstown, O.
WINDER, R. B.	716 Park ave., Baltimore, Md.
*WHITSLAR, F. S.	265 West Boardman st., Youngstown, O.
WILLIAMS, JACOB L.	1 Mount Vernon st., Boston, Mass.
WOLF, J. L.	1313 New York ave., Washington, D.C.

Any inaccuracies in the above list in name or location should be reported to the Treasurer at once, in order that the necessary corrections may be made.

Annual dues being payable in advance, no name appears on above list except of those who have paid for 1891, and Transactions are not sent to any who have not fully paid their dues. *Dues must be paid to the Treasurer.* Send draft, P. O. money order, or express order. If personal check is sent, twenty-five cents should be added for collection.

A. H. FULLER, *Treasurer*, 2602 Locust st., St. Louis, Mo.

The reading of the printed minutes was, upon motion, dispensed with.

The minutes *ad interim* were then read and approved.

MINUTES *AD INTERIM.*

The Secretary received the following communication :

CHICAGO, May 25, 1891.

DR. GEO. H. CUSHING, *Recording Secretary.*

The Executive Committee of the American Dental Association, in accordance with their instructions, have decided upon Saratoga Springs, N. Y., as the place of next meeting, and you will give notice accordingly.

The President has appointed as the local Committee of Arrangements, V. H. Jackson, of New York City ; A. C. Rich, of Saratoga Springs ; and E. C. Baxter, of Albany.

Also, to fill vacancy in Committee on Examination of Dental Protective Association, I. P. Wilson, of Burlington, Ia.

J. N. CROUSE, *Chairman of Executive Committee.*

The following amendment to the Constitution, proposed last year by Dr. Cushing, was then adopted :

To amend the Constitution by striking out the entire Section 2 of Article IV.

The Publication Committee offered the following, which was referred to the Auditing Committee :

REPORT OF PUBLICATION COMMITTEE.

The Publication Committee would respectfully report that at the last annual meeting, held at Excelsior Springs, The S. S. White Dental Manufacturing Company declined to longer publish the Transactions of this Association ; whereupon arrangements were made with Mr. A. W. Gray, the representative of H. D. Justi at Chicago, and with the Dental Review Company, to publish them upon the same terms as they have been published for several years last past.

The character of the work compares favorably with any heretofore done, and the thanks of this Association and of the Publication Committee are due Mr. Gray for the facilities afforded for the prompt issuance of the volume. The Transactions were mailed November 4, a date earlier, it is believed, than ever before in the history of the Association.

They were sent to such Societies, Libraries, Honorary and Active members as were entitled to them, and there are now on hand about seventy-five volumes.

The *Dental Review* also published the entire Transactions, less the business minutes, in its October issue, thus giving a wider distribution to them than they otherwise would have had.

RECEIPTS AND EXPENDITURES.

Received :		
From Treasurer	$118 00	
" sale of Transactions	3 75	
		$121 75
Expended :		
For expressage, paper, and copying	$17 20	
Postage	10 60	
Copying missing numbers of Transactions to complete files for Libraries	15 00	
Knight & Leonard, printing notices	5 00	
Engrossing memorial	12 00	
H. D. Justi's bill, postage and mailing	66 40	
		$126 20
Balance due the Publication Committee		$4 45

GEO. H. CUSHING, *Chairman.*

Audited and found correct.

GEO. W. MCELHANEY,
H. A. SMITH,
LOUIS OTTOFY, } *Committee.*

The Treasurer then read his report, as follows, which was referred to the Auditing Committee:

REPORT OF THE TREASURER.

SARATOGA SPRINGS, N. Y., August 4, 1891.

THE AMERICAN DENTAL ASSOCIATION IN ACCOUNT WITH A. H. FULLER, TREASURER.

By balance on hand August 5, 1890	$1368 74	
" dues received to date	1000 25	
Total		$2368 99

DISBURSEMENTS.

A. W. Harlan, for telegrams and cablegrams	6 25	
J. N. Crouse, paid for printing	43 50	
" " " postage	40 00	
" " " telegrams	5 38	
" " " cab hire	6 00	
L. Ottofy, printing, postage, etc.	4 96	
A. O. Hunt, stationery, expressage, etc.	15 70	
Geo. H. Cushing, balance due for expense Publication Committee	17 66	
Geo. H. Cushing, reporter's salary	125 00	
" " Recording Secretary's salary	200 00	
A. H. Fuller, Treasurer's salary	100 00	
Paid Janitor for services	15 00	
H. A. Smith, Chairman Section VI, printing, etc.	21 62	
Geo. H. Cushing, Chairman Publication Committee, for Justi's bill, postage, binding, etc., and for copying and incidentals	118 00	
J. J. R. Patrick, Section VI, as per resolution page 23, Transactions, Twenty-ninth Session	450 00	
A. H. Fuller, for postage	6 50	
Total		$1175 57
Balance on hand		$1193 42

A. H. FULLER, *Treasurer.*

Audited and found correct, August 5, 1891.

(Signed) H. A. SMITH,
GEO. W. MCELHANEY } *Auditing Committee.*
V. H. JACKSON,

The Executive Committee offered the printed programme, with the change of hour for evening sessions from 7 P.M. to 8 P.M. Adopted as a partial report.

The Committee on Unification of State Dental Laws reported by Dr. H. B. Noble as follows:

REPORT OF COMMITTEE ON STATE DENTAL LAWS AND THE APPOINTMENT OF DENTISTS IN THE ARMY AND NAVY.

SARATOGA, August 4, 1891.

Dr. A. H. Thompson, Chairman of the Committee on Legislation and the Appointment of Dental Surgeons in the Army and Navy, has requested me to report what has been done, the death of his father unfitting him for the work he had planned.

The Committee prepared a letter which was presented to the Surgeon-General of the Army and Navy:

"March 27, 1891.

"TO THE SURGEON-GENERAL OF THE UNITED STATES ARMY.

"The undersigned Committee were appointed by the American Dental Association, at its last meeting, to consider the feasibility of the appointment of dental surgeons in the army and navy.

"It is believed that the appointment of dental surgeons in the army and navy would be the means of relieving much suffering and saving the organs of mastication so necessary to health and comfort.

"This want is especially felt in our Western military stations by both men and officers far away from any dental surgeon, often requiring them to send members of their families hundreds of miles to get the service of a dentist.

"We should be pleased to have your opinion and advice on the above subject.

"Very respectfully,

"A. H. THOMPSON, D.D.S., Topeka, Kas., *Chairman.*
"J. Y. CRAWFORD, M.D., D.D.S., Nashville, Tenn.
"*Committee:* "W. W. WALKER, M.D.S., D D.S., New York, N. Y.
"C. N. PEIRCE, D.D.S., Philadelphia, Pa.
"H. B. NOBLE, D.D S., Washington, D. C."

The letter was presented in person, with such statements of facts within our knowledge as was deemed important.

The interview with the Surgeon-General, Dr. Sutherland, was a very pleasant one.

The following answer was received:

"WAR DEPARTMENT, SURGEON-GENERAL'S OFFICE.
"WASHINGTON, April 13, 1891.

"TO THE GENTLEMEN OF THE COMMITTEE OF THE AMERICAN DENTAL ASSOCIATION.

"*Gentlemen:* I have the honor to acknowledge receipt of your communication of March 27, 1891, in which you suggest the appointment of dental surgeons in the army and navy and request my opinion and advice on the subject.

"I am not in a position to speak as regards the navy, but so far as the army is concerned this is a matter which has been considered by the War Department on several occasions. So long as our army is distributed in small bodies over a vast extent of territory, and is actually in the field for a considerable part of the year, it is deemed impracticable to extend to it the benefits of skilled dental surgery, however desirable this might be on behalf of officers and men. Where troops are massed in garrison, as in a few instances, the military reservation is as a rule in the vicinity of some large city where the services of dental surgeons can be obtained.

"I am of the opinion, also, that the necessity for special dental service with the troops scattered over the West and South is less needful now than it was some years ago, for increased railroad facilities have brought the most remote posts within a few hours' journey of some growing city.

"I have the honor to be, gentlemen,

"Respectfully yours,

"C. SUTHERLAND,

"*Surgeon-General United States Army.*"

No response has been received from the Surgeon-General of the Navy, Dr. J. M. Browne, but the opinion was expressed that the need was growing less each year.

We should therefore not have the encouragement or favor of the medical men of the army and navy.

In asking or seeking such legislation at the hands of Congress (for it would require a special law or act of Congress), we should be likely to encounter opposition, as the questions of rank, pay, expenses, etc., would have to be considered.

The men are only enlisted for a definite term of service, and are not accepted unless the mouth, in the judgment of the medical examiner, is in fairly good condition, with enough good teeth to serve through the term of enlistment.

The materials used by a dental surgeon would be a fruitful source of trouble in the way of expense and record.

Officers would be very likely to want all sorts of impracticable work, and their families included on the free list, until the position of dental surgeon to "Uncle Sam" would be far from pleasant or agreeable, and would be sought and accepted only by the lazzaroni of the profession, who would not be likely to elevate our profession in the estimation of the medical or dental profession.

REPORT ON LEGISLATION.

The subject of dental legislation is a broad and deep one, and it is by no means clear just what is the best plan to secure unity of action in the various States, and also to lay down sound principles as a basis for dental laws.

There seems to be a diversity of opinion as to the powers that should be granted to Examining Boards in the various States, and as to whether a diploma from a reputable dental college shall exempt the holder from an examination. The trouble appears to be as to who shall determine what is a reputable college, and to draw a line between or designate the good and the poor, the reputable and the disreputable.

It seems only fair and just that a graduate should have some standing. As a rule, we do not believe that Examining Boards are so well calculated to determine the competency of candidates as an instructor or regular teacher. We have thought that perhaps this difficulty could be overcome by a committee from the Examining Board in each State being present at college examinations in the State, and if said examinations were satisfactory that the committee should indorse the diplomas, which when so indorsed should exempt the holders from any further examination. We think no reputable college would object to the presence and assistance of such a committee to

indorse their work. Would not such a committee act as a stimulant to good college work, and by dividing the responsibility in the granting or rejecting of diplomas, make proficiency, rather than numbers, the standard of success in college work, and so disarm the charge sometimes heard that interested professors aim merely to see how large a number they can graduate from their schools?

A National Committee, selected from the National Examiners Association, might perhaps be better than a State Committee, if such a committee could be secured; but it is doubtful if a competent National Committee could be secured to serve without compensation. We believe in colleges and college work, and that to the thoroughness of their work we must look for the proper education, elevation, and growth of our profession. When their work has been properly done, let us indorse and encourage them by laws that will properly recognize the fact.

By a National or State Committee, working in harmony with our colleges, we shall best disarm the feeling of jealousy or want of harmony between college faculties and examining boards which has appeared at the annual meetings of these two bodies and in various State societies.

Let us, as an Association and as individuals, work to harmonize the labor of these bodies. In union there is strength. Can we not secure this union by a Committee, either National or State, to assist in the examination of students? By such a union we should soon have harmony of action in our State laws.

The National Association of Faculties and the National Association of Examiners have each performed a good and commendable work in securing a three years' term of study and a more thorough and uniform system of examination of those who would enter our profession.

When dental laws were first enacted, the ignoring or supervision of diplomas from a reputable dental college was not contemplated, but the rapid increase of colleges and their competition for patronage soon brought suspicion upon the thoroughness of the work of instruction in some, and thus cast doubt upon a diploma as a test of fitness for practicing our profession. It was believed by many that the proper way to correct this was by giving the examining boards power to ignore all diplomas. This has been done in several States, thus reducing the reputable diploma from a good college to the level of the poorest, and casting a doubt upon all, which will soon be felt and acted upon outside of the United States.

Is it not the better plan to seek to improve our colleges and elevate them to the highest rank by recognizing their work when it has been properly done, and so give their students standing and recognition, making a diploma mean what it says, rather than to degrade and ignore it? Have not our colleges furnished the men for society organization and work? Have not the societies so founded been the parents of dental legislation and Examining Boards? Their teaching and advice should be sought rather than discarded; college training is one of the foundation-stones of professional life.

Another reason for making the college diplomas stand for something is that we may, if desirable, move our residence freely without being subjected to an examination every time a State line is crossed. Some of our most skillful and scientific operators could not pass a strict technical examination such

as is required of the student for graduation. Old practitioners, and those who have creditably passed an examination by those qualified to conduct it, should not, we think, be required to go before an Examining Board every time they may change their location. This may be avoided by recognizing a diploma from a reputable dental college.

This of course brings us back to the character and reputation or standing of the college, and we think this can best be ascertained by a National or State Committee. It does not seem feasible to seek a National law, as each State would justly claim the right to construct its own laws, but great care should be taken in framing these laws that they may be legal and just, and not retroactive, as in the case of the New Hampshire act that was overthrown.

Dental legislation has had a very rapid growth, possibly too fast for a sound and healthy stock. Perhaps a little pruning of some of our State laws may be desirable, rather than a stimulation of growth, thereby rendering them more uniform and strong, and better adapted to the wants of the profession, and to resist any assaults that may be made upon them; for it would be strange if assaults were not made upon them by those who may seek to avoid or overthrow them.

Let us, then, endeavor to unite and strengthen our forces by united and harmonious action of State and National societies, and of colleges and Examining Boards. In harmony and union there is strength and success.

We wish to call attention to the fact of there being no dental law in the District of Columbia, and as the senators and representatives from the States have the making of the laws for the District, to request that all dentists throughout the United States will ask their senators and members to give their attention to the matter, which has been so long neglected. Year after year have bills been brought in only to be neglected and laid aside, and we ask that every member of this Association give this matter his attention and assistance.

H. B. Noble,
Of the Committee on Legislation.

The report was adopted.

The Committee on the Examination of the Books of the Dental Protective Association not being ready to report, was granted further time.

The Committee on Business Management not being ready to report, was granted further time.

The Committee on the New Hampshire case reported by their Chairman, Dr. Shepard, as follows. The report was accepted.

REPORT OF COMMITTEE ON NEW HAMPSHIRE LAW.

The undersigned, appointed as a Committee, under a resolution adopted last year, to investigate the nature and status of the litigation in regard to the Dental Law of New Hampshire, with authority, "in their discretion, to draw on the Treasurer of this Association for an amount not to exceed five hundred dollars," would respectfully report:

That the statement made to this Association last year was correct as to the Dental Law of New Hampshire, passed in 1879, having been declared unconstitutional by the Supreme Court of that State.

That the statement was incorrect as to the reported appeal of the case to the Supreme Court of the United States.

The fact is that the dentists of New Hampshire wisely accepted the decision of their own highest court, and instead of wasting their means by an appeal to the Supreme Court of the United States, have applied themselves successfully to the enactment of a new law which does not contain the unconstitutional provisions.

The decision of the New Hampshire Supreme Court is appended.

From this it will be seen that the old law made an unjust, frivolous, and ridiculous distinction between men of the same class, and was retroactive in the most objectionable form.

The distinction was that a dentist who had resided and practiced his profession in the town or city of his residence January 1, 1879, for all the four years preceding its enactment—that is, from January 1, 1875—could retain his right to practice, but another man, who, although he may have been in reputable practice in the State for fifty years, had moved either his residence or place of business within the four previous years, lost all his rights.

Your Committee therefore decided that it had nothing to do under the resolution but to report as above.

Respectfully submitted,

L. D. SHEPARD,
THOMAS FILLEBROWN,
GEO. H. CUSHING.

"UNCONSTITUTIONAL.

"DECISION OF ESPECIAL INTEREST TO THE MEDICAL AND DENTAL PROFESSIONS.

"At the adjourned law term of the Supreme Court to-day opinions were given in the cases of State *vs.* C. D. Hinman, and State *vs.* D. D. Pennoyer, the former a dentist and the latter a physician, who were indicted in Rockingham County for practicing without a license. The opinion in the first case was given by Judge Clark, as follows:

"This is an indictment under Chap. 132, Gen. Laws, for practicing dentistry without a dental degree or license. The respondent demurred upon the ground that the statute is unconstitutional.

"The object of the statute upon which the indictment is founded is to secure the possession of the requisite skill and learning by practitioners of medicine, surgery, and dentistry. The possession of such special qualifications as to knowledge and skill is so essential to the protection of the lives, health, and comfort of the people of the State, that it cannot be doubted that it is within the power of the Legislature to secure it by the enactment of such reasonable conditions as are calculated to exclude from practice those unfitted therefor. Hewitt *vs.* Charier, 16 Pick. 353; State *vs.* State Med. Ex. Board, 32 Minn. 324; Eastman *vs.* State, 7 West. Rep. 421 (Ind.)

"Is the statute repugnant to the Federal or State Constitution in any of its provisions? It is contended that it is in violation of Section 2 of Article 4 of the Constitution of the United States, and of Section 1 of the fourteenth amendment to the Constitution, because it discriminates against persons engaged in

the same business or profession, and denies to them the equal protection of the laws; and that it is in violation of Article 2, part first, of the State Constitution, which declares that all men have the natural, essential, and inherent right of acquiring and possessing property and seeking and obtaining happiness.

"Section 3 of Chap. 132, General Laws, upon which the indictment is founded, provides that 'it shall not be lawful for any person who is not duly authorized to practice medicine or surgery, or to practice dentistry, unless such person has received a dental degree from some college, university, or medical school authorized to confer the same, or shall have obtained a license from the New Hampshire Dental Society.' Section 6 provides that 'each person receiving a license upon examination shall pay for the use of the Society granting the same the sum of five dollars; upon diploma, one dollar.' Section 3 declares that 'the provisions of the preceding sections shall not apply to persons who have resided and practiced their profession in the town or city of their present residence during all the time since January 1, 1875, nor to physicians residing out of the State when called into the State for consultation with duly licensed physicians, or to attend upon patients in the regular course of business.'

"While the power of the Legislature to impose restrictions upon the exercise of certain trades and professions for the protection of the public is unquestioned, it must be exercised in conformity with the constitutional requirement that such restrictions must operate equally upon all persons pursuing the same business or profession under the same circumstances. The constitutionality of a statute cannot be sustained which selects particular individuals from a class or locality and subjects them to peculiar rules, or imposes upon them special obligations or burdens, from which others in the same locality or class are exempt. (Cooley Const. Limitations 391.) The imposition of special restrictions or burdens, or the granting of special privileges to persons engaged in the same business under the same circumstances, is in contravention of the equal right which all can claim in the enforcement of the laws, and in the enjoyment of liberty and the right of acquiring and possessing property.

"If the statute had declared that its provisions should not apply to persons practicing their profession in the city of Concord, such an arbitrary discrimination would be clearly repugnant to the principle of constitutional equality. The exemption of all physicians, surgeons, and dentists residing and practicing their profession in Concord from the burden of procuring and paying for a license, and the subjection of all other persons practicing the same professions elsewhere in the State to the expense of purchasing a license, would be palpable violation of constitutional rights. The exemption of the statute of persons who have resided and practiced their profession in the town or city of their present residence during all the time since January 1, 1875, or during all the time from January 1, 1875, to January 1, 1879, from its operation, is no less in conflict with constitutional provisions. By an arbitrary test, having no reference to skill, learning, or fitness for the practice of that profession, certain persons are exempted from the payment of a license fee to which others of equal and perhaps superior acquirements and experience are subjected. It is a discrimination founded solely upon the accidental circumstance of residence, or of a change of residence, and falls within the prohibition of the constitution.

"The village of Penacook is partly within the limits of the city of Concord and partly in the town of Boscawen. Suppose that on January 1, 1875, two persons, neither of whom had received a dental degree, were residing and practicing dentistry in that part of the village of Penacook within the limits of Concord. They continued in practice there until January 1, 1878, when both changed their place of residence,—one removing a distance of six miles, to the city of Concord, and the other removing a distance of a few rods, to the Boscawen portion of the village of Penacook, and both have continued the practice of their profession in their respective places of residence ever since. Under the provisions of the statute the dentist who had removed

his residence six miles is not required to procure a license, while the man who has removed the distance of a few rods is compelled to submit to an examination and pay a license fee of five dollars to enable him to continue the practice of his profession, because he changed his residence from Concord to Boscawen.

"The statute also discriminates against citizens of other States.

"It does not apply to persons residing and practicing their profession in the same town or city in the State from January 1, 1875, to January 1, 1879; whence persons who have resided and practiced their profession continually since January 1, 1875, in the same town or city in another State, are required upon removing to procure a license to practice their profession.

"The constitutional objection to the statute is that it imposes the burden of a license fee upon certain persons, and exempts others of the same class and profession under similar circumstances and conditions. Loon Hing *vs.* Crowley, 113 U. S. 703; Yick Wo *vs.* Hopkins, 118 U. S. 356.

"Demurrer sustained."

Dr. Taft offered the following, which was adopted:

Resolved, That a permanent standing Committee on Necrology be appointed, to consist of five members, whose duty it shall be to act, without further instruction from this body, as occasion may require, and report to the annual meeting of the Association.

The following were appointed as that Committee: J. Taft, Louis Jack, Geo. W. McElhaney, Frank Abbott, E. S. Talbot.

The Credentials Committee made a partial report, which was adopted as a report of progress, and subsequently completed as follows:

REPORT OF COMMITTEE ON CREDENTIALS.

American Academy of Dental Science—Jacob L. Williams.

Chicago Dental Society—C. N. Johnson.

Connecticut Valley Dental Society—E. A. Stebbins.

First District Dental Society of New York—Louis C. LeRoy, Geo. Evans, Dwight Smith.

Hayden Dental Society of Chicago—Louis Ottofy.

Illinois State Dental Society—Louis Ottofy, Geo. H. Cushing, J. N. Crouse, T. W. Brophy, A. W. Harlan, W. B. Ames, A. W. Freeman.

Indiana State Dental Society—Geo. E. Hunt, S. B. Brown.

Kansas State Dental Association—E. A. Floyd.

Maryland State Dental Society—A. J. Volck.

Missouri State Dental Association—H. S. Lowry, E. E. Shattuck.

Mississippi Valley Dental Society—Grant Mollyneaux, Corydon Palmer.

Missouri Dental College—A. H. Fuller.

New Orleans Odontological Society—Andrew G. Friedrichs.

Nebraska State Dental Society—H. T. King.

New Jersey State Dental Society—R. M. Sanger, W. P. Richards.

Northern Ohio Dental Society—H. F. Harvey.

New York State Dental Society—C. K. Van Vleck.

Odontological Society of Pennsylvania—E. C. Kirk, Louis Jack, Geo. F. Root, C. N. Peirce, James Truman, J. Howard Gaskill, M. B. Culver, S. H. Guilford.
Odontological Society of New York—Chas. B. Atkinson.
St. Louis Dental Society—W. H. Eames, J. B. Newby.
Susquehanna Dental Association—V. S. Jones.
Tennessee State Dental Association—J. Y. Crawford.
Vermont State Dental Society—James Lewis.
Washington City Dental Society—James B. Hodgkin, J. B. Rich, J. L. Wolf.
Western Dental College, Kansas City—H. S. Lowry.

The Treasurer was instructed to pay all properly authenticated bills.

The President, Dr. Harlan, then read the annual address; Dr. Patterson, the First Vice-President, in the chair.

Upon the conclusion of its reading, Dr. Barrett moved that a committee of five be appointed to consider the recommendations contained in the President's address. Carried.

The following were appointed by Dr. Patterson: W. C. Barrett, Frank Abbott, James Truman, Thos. Fillebrown, and H. B. Noble.

Adjourned till 8 P.M.

FIRST DAY—EVENING SESSION.

The Association was called to order at 8.15 P.M., the President, Dr. Harlan, in the chair.

Nothing being offered under Miscellaneous Business,

Section VI was called, and the Chairman, Dr. H. A. Smith, read the report.

A short report on Implantation was read by Dr. Louis Ottofy, Secretary of the Section.

Dr. E. S. Talbot read a paper entitled "Mouth-Breathing not the Cause of Contracted Jaws and High Vaults."

This was discussed by Drs. Geo. J. Friedrichs, Talbot, Abbott, Fillebrown, Horton, and Watkins.

Invitation was here extended to members of the profession from foreign countries to take part in the debate.

Discussion was then resumed and participated in by Drs. Peirce, Morgan, Truman, Abbott, and Patrick, and was closed by Dr. Talbot.

Dr. Patrick then made a short report on the Examination and Tabulation of Crania, which was accepted as a report of progress. It was to be completed and furnished to the Publication Committee after adjournment. [It will be found under Section VI, in Transactions.]

Dr. Custer read a paper on the Physiological Action of Obtundents, the discussion of which was postponed till to-morrow.

Under Miscellaneous Business, the President appointed to fill vacancies in the Committee to examine the books of the Dental Protective Association, Drs. L. D. Shepard and H. A. Smith.

He also appointed the Committee on Necrology, whose names will be found with the resolution calling for their appointment.

Adjourned to meet at 9 o'clock A.M. to-morrow.

SECOND DAY—MORNING SESSION.

The Association was called to order at 9.30 A.M., Dr. Harlan, the President, in the chair.

The minutes of last evening's session were read and approved.

The Committee on Credentials made a partial report, which was accepted as a report of progress.

The President announced that Dr. Corydon Palmer would occupy a few minutes in presenting something of interest to the Association.

Dr. Palmer not being ready, and there being no other miscellaneous business, discussion of Dr. Custer's paper was called for. None being offered, a paper by Dr. A. H. Thompson, entitled "Dentition of the Felidæ," was read by Dr. C. N. Peirce.

Dr. Palmer being now ready, unveiled an oil painting of our deceased friend, Dr. W. H. Atkinson, which he presented to the Association, accompanied with appropriate remarks.

The painting will remain in his custody until the Association designates some place for its permanent establishment.

On motion of Dr. Stockton, a vote of thanks was extended to Dr. Palmer.

Discussion of Dr. Thompson's paper was participated in by Drs. Barrett, Peirce, Carroll, Truman, Brophy, Morgan, Rhein, and Marshall. The subject was passed.

Dr. Patterson then read a paper entitled "Diseases of the Oral Mucous Membrane." He was followed by Dr. H. A. Smith, who read a paper entitled "Phagocytosis." The two papers were discussed by Drs. Rhein, Barrett, Cravens, Geo. F. Waters, LeRoy, Morgan, and Crawford. Closed by Dr. Patterson.

Section VII was called, and Dr. Barrett read a paper entitled "A Plea for Conservatism."

The hour for the organization of Sections having arrived, they were organized and completed as follows :

ORGANIZATION OF SECTIONS.

Section I. Prosthetic Dentistry, Chemistry, and Metallurgy.—W. B. Ames, chairman ; Alonzo Boice, secretary ; D. R. Stubblefield, C. C. Carroll, Grant Mollyneaux, Geo. F. Root, A. N. Priest, W. S. How, A. J. Volck, Geo. Evans, M. L. Chaim, V. S. Jones, B. Q. Stevens, C. L. Goddard, A. W. Freeman, J. H. Gaskill, C. R. Jefferis, J. Rollo Knapp, T. S. Waters, J. W. Heckler, W. H. Buckley, Henry Barnes, E. Parmly Brown, A. G. Bouton, Henry Cowie, W. H. Colgrove, C. S. Case, Henry S. Colding, F. Y. Clark, J. S. Cassidy, Emma E. Chase, W. A. Coston, D. E. Coulson, I. B. Davenport, C. E. Esterly, E. M. S. Fernandez, W. B. Finney, S. Freeman, T. H. Gilpin, W. E. Griswold, W. W. Hertz, C. B. Hewitt, E. P. Hazen, J. G. Hollingsworth, M. G. Jenison, T. L. James, S. E. Johnston, Sam'l E. Knowles, H. H. Keith, E. P. Keech, G. Knepper, D. E. Kelley, B. Holly Smith, A. Wilkes Smith, M. B. Straight, J. A. Swasey, A. T. Smith, W. C. Stewart, A. H. Sibley, M. E. Smith, J. H. Smith, P. T. Smith, E. E. Shattuck, E. A. Stebbins, R. M. Sanger, Dwight Smith, C. A. Timme, W. W. Vance, W. C. Wendell.

Section II. Dental Education, Literature, and Nomenclature.—Louis Ottofy, chairman ; S. H. Guilford, secretary ; C. N. Peirce, J. Taft, Louis Jack, D. R. Stubblefield, H. A. Smith, A. O. Hunt, J. L. Williams, L. C. Ingersoll, A. E. Baldwin, C. B. Rohland, W. W. Allport, E. S. Holmes, Wm. Conrad, C. A. Brackett, R. B. Winder, Jas. B. Hodgkin, A. H. Thompson, H. W. Morgan, C. P. Pruyn, J. N. Farrar, H. B. Noble, C. D. Cook, S. A. Freeman, John

B. Rich, W. H. Morgan, J. Hall Moore, S. B. Brown, J. Adams Bishop, E. A. Bogue, Geo. H. Cushing, Jas. Cleland, W. R. Clifton, C. C. Chittenden, E. T. Darby, A. M. Dudley, E. D. Downs, W. H. Dwinelle, W. H. Eames, Geo. L. Field, Geo. J. Friedrichs, F. J. S. Gorgas, P. G. C. Hunt, T. S. Hacker, T. T. Hayward, C. I. Keely, C. R. E. Koch, Jos. Lathrop, F. A. Levy, J. D. Lanier, H. S. Lowry, J. S. Letord, B. G. Maercklein, F. S. Maxwell, W. J. Martin, Robert Maercklein, J. H. Martindale, H. C. Miller, G. W. McElhaney, D. N. McQuillen, E. Noyes, L. D. Shepard, Sam'l A. White, J. W. Wassall, R. A. Wasson, J. L. Wolf.

Section III. Operative Dentistry.—C. S. Stockton, chairman; A. W. McCandless, secretary; S. C. G. Watkins, J. E. Cravens, N. S. Hoff, J. Y. Crawford, C. N. Johnson, V. H. Jackson, Louis C. LeRoy, C. N. Peirce, A. E. Baldwin, C. B. Rohland, C. H. Harroun, W. H. Baird, W. W. Allport, W. W. Shryock, W. F. Fundenberg, W. H. Fundenberg, L. C. Taylor, John W. Meng, M. F. Finley, Wm. Conrad, Chas. K. Van Vleck, E. A. Floyd, C. R. Butler, G. W. Hoysradt, Thos. Fillebrown, W. E. Page, E. S. Gaylord, Dwight M. Clapp, Wm. H. Shulze, Earl P. Hawes, H. B. Noble, Eugene H. Smith, B. F. Luckey, R. F. Ludwig, B. Oscar Doyle, W. N. Morrison, S. B. Palmer, B. Douglass, H. F. Harvey, J. B. Monfort, J. Hall Moore, Chas. B. Atkinson, M. B. Culver, J. Adams Bishop, A. E. Brown, E. Parmly Brown, E. T. Darby, Chas. E. Dunn, P. G. C. Hunt, F. O. Hetrick, Jas. McManus, G. W. McElhaney, D. N. McQuillen, S. G. Perry, Jas. G. Palmer, C. J. Peterson, F. Peabody, F. A. Remington, L. D. Shepard, Sam'l A. White, J. C. Walton, W. H. Whitslar, T. E. Weeks, F. S. Whitslar, Jos. R. C. Ward.

Section IV. Histology and Microscopy.—Frank Abbott, chairman; I. P. Wilson, secretary; L. C. Ingersoll, Theo. Stanley, W. X. Sudduth, J. B. Monfort, L. L. Davis, A. E. Griggs, F. H. Gardiner, Chas. E. Graves, Jas. B. Newby, R. E. Nickles, E. D. Swain.

Section V. Materia Medica and Therapeutics.—A. W. Harlan, chairman; Geo. E. Hunt, secretary; Jas. Truman, N. S. Hoff, W. W. Walker, Wilbur F. Litch, J. W. Palmer, Alfred R. Starr, M. W. Foster, L. M. Mathews, H. B. Noble, J. G. Reid.

Section VI. Physiology and Etiology.—H. A. Smith, chairman; L. E. Custer, secretary; W. P. Horton, J. D. Patterson, Louis Ottofy, W. C. Barrett, H. J. McKellops, A. H. Fuller, J. J. R. Patrick, Geo. F. Waters, W. S. How, A. H. Thompson, C. L. Goddard, Theo. Stanley, W. X. Sudduth, A. L. Northrop, F. M. Odell, Jessie M. Ritchey, W. P. Richards, B. Holly Smith, E. S. Talbot, M. V. Toledo.

Section VII. Anatomy, Pathology, and Surgery.—T. W. Brophy, chairman; M. L. Rhein, secretary; L. E. Custer, W. C. Barrett, J. S. Marshall, W. H. Morgan, J. D. Patterson, J. Y. Crawford, Norman J. Roberts, H. T. King, A. H. Thompson, C. L. Goddard, Arthur B. Freeman, T. L. Gilmer, C. Sill, G. L. Curtis, A. G. Friedrichs.

On motion, adjourned till 8 P.M.

SECOND DAY—EVENING SESSION.

The Association was called to order by the President, Dr. Harlan, at 8.45 P.M.

Under Miscellaneous Business,

By unanimous consent, it was decided to make the selection of the place of the next meeting and the election of officers the special order for 4 P.M. to-morrow, instead of 11.30 A.M. Friday morning.

By consent, Dr. Crouse explained the situation of litigation as conducted by the Protective Association.

The Committee appointed to examine the books of the Protective Association reported as follows, which report was adopted :

REPORT OF COMMITTEE TO EXAMINE BOOKS OF DENTAL PROTECTIVE ASSOCIATION.

The undersigned, appointed as a Committee to examine into the general management of the Dental Protective Association of the United States, would respectfully report that we have examined the books and accounts and found them kept in a business-like manner; we consider that the affairs have been managed economically.

We find that all bills to date have been paid, and are happy to report that there is confident expectation that there will be paid of the notes given on joining the Association above $12,000 before the year is ended. And we are most happy to report that there is to-day on deposit to the credit of the Dental Protective Association in the First National Bank of Chicago $10,933.33,—making a total of assets of cash and good notes of about $23,000.

Respectfully submitted,

L. D. SHEPARD,
H. A. SMITH,
W. W. WALKER,
J. Y. CRAWFORD.

The Committee to whom was referred the President's address read their report.

Dr. Marshall moved that the recommendations of the Committee lie over under the Constitution till next year.

Dr. Rich moved to amend by referring the report to a Committee of five. The amendment was lost.

Dr. Shepard moved as a substitute that the report be referred back to the Committee for perfection. Carried.

On motion of Dr. McKellops, Dr. Peirce related a case of the swallowing of a rubber-dam clamp.

There being no discussion on Dr. Barrett's paper, Dr. Marshall read a paper on "Pyoktanin in the Treatment of Cancerous Growths."

On motion, the discussion of Dr. Marshall's paper was deferred till to-morrow.

Adjourned till to-morrow at 9 A.M.

THIRD DAY—MORNING SESSION.

The Association was called to order at 9.30 A.M.; the President, Dr. Harlan, in the chair.

The minutes of last evening's session were read and approved.

Nothing being offered under Miscellaneous Business, the discussion of Dr. Marshall's paper was participated in by Drs. Geo. F. Waters, Truman, and Friedrichs.

Dr. Patterson then read a paper entitled "Fracture of the Lower Maxilla by a Gunshot Wound. Treatment by an Interdental Splint-bridge."

Discussed by Drs. Carroll, Marshall, Horton, and Patterson.

On motion, the subject was passed.

Dr. Brophy described a method of closing the hard palate.

Discussed by Drs. Marshall, Cravens, Patterson, and Volck. Closed by Dr. Brophy.

The subject was passed.

Section I was called. Dr. Ames, the Secretary, verbally reported that the Section had but one paper to present, and that, by Dr. Stubblefield, on "Hydrogen Peroxide *per se*."

Also that Dr. E. Parmly Brown would explain a "Simple Method of Banding and Crowning Roots."

Dr. Stubblefield then read his paper, which was discussed by Drs. Peirce, Abbott, Volck, Friedrichs, Truman, Ingersoll, Horton, and Marshall, and closed by Dr. Stubblefield. Subject was passed.

Dr. Brown then described his method of banding roots and crowns.

Dr. Ames showed a method of securing perfect joints between gold bands and porcelain crowns, by Dr. J. G. Hollingsworth, of Kansas City.

Discussed by Dr. Carroll and passed.

Section II being called, the report of the Section was read by their Secretary, Dr. Ottofy, and Dr. Peirce read a paper by Dr. Koch, entitled "State Boards (the People's Officers) and the Profession."

Discussed by Drs. Abbott, Crawford, Barrett, Patterson, and Crouse.

On motion, the subject was passed.

Under Miscellaneous Business, Dr. Abbott moved that the Executive Committee be instructed to endeavor to make such arrangements with The S. S. White Dental Manufacturing Company as formerly existed, regarding the publication of the Proceedings.

Discussed by Drs. Truman, Abbott, Crouse, and Cushing.

The motion prevailed.

Adjourned to meet at 4 P.M.

THIRD DAY—AFTERNOON SESSION.

The Association was called to order at 4.10 P.M.; the President, Dr. Harlan, in the chair.

The minutes of the morning session were read and approved.

The special order being "the selection of the place of the next meeting, and the election of officers," was then proceeded with.

The following nominations for place of meeting were made : Atlantic City, Niagara Falls, San Francisco, Lookout Mountain, Put-in-Bay, and Washington.

The ballot resulted in the choice of Niagara Falls by a vote of fifty-two out of seventy-three, on the second ballot.

The vote for President being called for, Dr. Truman moved that the first ballots be informal, nominating ballots. Carried.

On the first ballot seventy-five votes were cast ; necessary to a choice, thirty-eight. Of these, Dr. W. W. Walker received forty-eight.

On motion, the informal ballot was declared a formal ballot, and the election of Dr. Walker was made unanimous.

On the first ballot for First Vice-President seventy-two votes were cast ; necessary to a choice, thirty-seven. Of these, Dr. J. D. Patterson received forty-seven.

The informal ballot was made formal, and the election of Dr. Patterson made unanimous.

Dr. S. C. G. Watkins receiving a majority of all the votes cast for Second Vice-President on the informal ballot, the ballot was made formal and his election made unanimous.

The Secretary was instructed to cast the vote for Dr. F. A. Levy for Corresponding Secretary.

On motion, the President was instructed to cast the vote for Dr. Geo. H. Cushing for Recording Secretary.

The Secretary was instructed to cast the vote for Dr. A. H. Fuller for Treasurer.

The following were elected on the first ballot as members of the Executive Committee for three years : J. N. Crouse, G. W. McElhaney, and V. H. Jackson, making the officers elected as follows :

President, W. W. Walker, New York City.
First Vice-President, J. D. Patterson, Kansas City, Mo.
Second Vice-President, S. C. G. Watkins, Mont Clair, N. J.

Corresponding Secretary, F. A. Levy, Orange, N. J.
Recording Secretary, Geo. H. Cushing, Chicago, Ill.
Treasurer, A. H. Fuller, St. Louis, Mo.
Executive Committee, J. N. Crouse, G. W. McElhaney, and V. H. Jackson.

On motion, adjourned to meet at 8 o'clock this evening.

THIRD DAY—EVENING SESSION.

The Association was called to order by the President, Dr. Harlan, at 8.35 P.M.

The minutes of the afternoon session were read and approved.

Under Miscellaneous Business,

The Committee on the President's Address submitted their revised report.

Dr. Fillebrown offered the following, which was adopted:

Resolved, That the Committee on the Revision of the Constitution be continued, and that any suggestions proposed by members received by the Committee within thirty days after the mailing of the report to members may be incorporated in the final report which will appear in the published Transactions, and such publication shall be deemed a sufficient notice of proposed amendments, so that a vote may be taken upon them at the next annual meeting.

The report, as received by the Secretary October 1, 1891, will be found immediately after the Memorial pages.

On motion, a vote of thanks was tendered to Dr. Timme for his interesting and valuable clinic.

On motion of Dr. Taft, Dr. J. B. Rich and Dr. Corydon Palmer were elected permanent members under the resolution respecting those who have been in practice fifty years, adopted in 1886.

Dr. H. A. Smith moved that an appropriation of five hundred dollars be made to continue the examination of crania, to be expended under the direction of the same Committee appointed for that purpose in 1889, viz: Section VI of this Association. Carried.

Dr. Ottofy moved that the Committee having this matter in charge solicit aid from the various local societies. Carried.

Also voted, on motion of Dr. Ottofy, that the Transactions of this Association containing the records of this work be forwarded to all societies which have contributed or may contribute to the fund referred to.

Dr. Taft, Chairman of the Committee on Necrology, then read their report, which will be found on the Memorial page. Remarks were made by Drs. Friedrichs, Horton, Barrett, Butler, Morgan, Crawford, Patterson, Corydon Palmer, and Dwinelle. The report was adopted.

On motion, a Committee of two was appointed to confer and cooperate with those societies that have taken steps toward preparing a memorial to Dr. Atkinson. The President appointed Drs. J. S. Marshall and C. S. Stockton.

Section III, Operative Dentistry, was then called, and Dr. V. H. Jackson read a paper on "Methods of Regulating Teeth."

Dr. N. S. Hoff, Secretary of the Section, then read their report.

Dr. Custer read a paper on "Local Anesthetics and Pain-Obtunders."

On the conclusion of the reading of Dr. Custer's paper, the Association adjourned to meet at 9 A.M. to-morrow.

FOURTH DAY—MORNING SESSION.

The Association was called to order by the President, Dr. Harlan, at 9.50 A.M.

The minutes of the evening session were read and approved.

Under Miscellaneous Business,

Dr. Peirce offered the following standing resolution, which was adopted :

Resolved, That this Association now in session direct that Sections belonging thereto shall in the future be prohibited from inviting individuals who are violating the code of ethics to hold clinics or to give other exhibitions before this body.

On motion, Section III was passed, and Section IV was called.

Dr. Abbott read the report of the Section. Also a paper by Dr. Heitzmann and himself on "Senile Atrophy of the Upper Jaw."

Discussed by Drs. Hunt, Ingersoll, and Abbott.

The Section was passed.

Section V was called, and Dr. Marshall read a paper entitled "Electricity as a Therapeutic Agent in the Treatment of Hyperemia and Congestion of the Pulp and Peridental Membrane."

Discussed by Drs. Geo. J. Friedrichs, Abbott, Horton, Shepard, Butler, A. O. Hunt, A. G. Friedrichs, Morgan, and Marshall.

On motion of Dr. Truman, Dr. Stebbins was requested to show by a patient present the effect of nitrate of silver on decay of children's teeth.

Under Miscellaneous Business, the following was adopted :

Resolved, That we extend a vote of thanks to the railroads for their concessions. Also to the local Committee of Arrangements, and especially to Dr. A. C. Rich, for the considerate and efficient service that has tended to render our stay in Saratoga so pleasant.

The minutes were then read and approved, and the installation of officers was proceeded with.

Drs. McKellops and Abbott were appointed to conduct the newly-elected President to the chair, which he assumed with brief but appropriate words of thanks.

Dr. W. W. Walker, the newly-elected President, in the chair.

On motion, Dr. Corydon Palmer was allowed ten minutes in which to address the Association on the subject of Operative Dentistry.

The President appointed on the Publication Committee Drs. E. T. Darby and A. W. Harlan.

The Executive Committee was instructed to announce the local Committee of Arrangements in time for publication in the Transactions.

[The Committee was unable to furnish the announcement in time for publication in the Transactions, but they will appear in the programme to be sent to members before the next meeting.—SEC'Y.]

Dr. Floyd made some brief remarks.

On motion, adjourned to meet at Niagara Falls the first Tuesday in August, 1892.

GEO. H. CUSHING, *Secretary.*

IN MEMORIAM.

DR. W. H. ATKINSON.

In the providence of an all-wise and overruling Father, the subject of this tribute was removed from this to a higher life at his home in New York, April 2, 1891.

It is eminently proper that there should be placed upon the records of this Association some evidence of the esteem and appreciation entertained by the members of this body for Dr. Atkinson.

He was one of the founders of this Association, and none labored with a more persevering industry than he for its permanent establishment and enduring welfare. He was always present at its meetings, and ever ready with a hearty willingness to fulfill any duty or perform any work assigned to him; he doubtless made a deeper and broader impress upon this body than any other member; he was always the advocate of a broad and liberal policy, impatient with the low, narrow, and selfish. He possessed strong convictions, and was ever ready to avow and defend them; mere antagonism added strength to his forceful nature; notwithstanding this, he would yield with childlike simplicity to evidence and reason when properly presented.

He was not only interested here, but in association work everywhere, and gave aid and co-operation in the organization and maintenance of dental societies throughout this country. He was enthusiastic in the formation of dental and scientific societies, throwing his whole energy, whenever opportunity offered, into such enterprises.

He was also greatly interested in the subject of dental education, ever ready to give wise counsel and aid whenever it was in his power and wherever needed.

By his enthusiasm he awakened interest and stimulated thought wherever he went; indeed, his presence was an inspiration. He exercised an almost unparalleled influence in the profession, and that, too, in the way of aiding and making better, professionally, those who came within its sphere; this he did at home, in his office, and abroad.

He was the first to formulate many new points in practice; he never hesitated to put forth anything that he thought would be of service to others; he communicated freely all he had.

He possessed a wonderful faculty for communicating knowledge to others, as was shown in the fact that for years he had private classes that came to his office at stated times and sat under his instruction; and such was his fervor in this work, that he was able to communicate not only of his knowledge, but of his enthusiasm as well, to those who were his pupils.

Everything he did and every resource he possessed were made subservient to his ambition for the advancement of dental science and art.

He had a broad, generous, sympathetic nature, with a heart large enough for the reception of all who had any just claim upon the regard and esteem of our common humanity.

He was a firm, ever-abiding friend, sympathetic, kind, and always ready to aid those in trouble.

And now, in view of this great loss,

Resolved, That we will ever cherish and will seek to perpetuate the memory of our departed brother, whose loss we so sadly mourn to-day; that we will not only cherish it ourselves, but will seek to bear it on to those who come after us.

Resolved, That in all the traits of this grand character as above delineated there is an example to which we may with profit conform, and especially may the younger and the coming members of the profession be directed to this great exemplar.

Resolved, That this tribute of regard and affection be spread on a memorial page of the Transactions of this body.

Resolved, That a copy properly engrossed be sent to the family of the deceased.

Resolved, That a copy be sent to the dental journals of this and other countries for publication.

Dr. Butler: I move that the report be received and the recommendations carried out.

Dr. George J. Friedrichs: I cannot allow this occasion to pass without saying a few words. From the professional intercourse that I have had with Dr. Atkinson he was endeared to me. Nature never repeats herself, as we well know, and consequently in my estimation he has occupied a place in the history of this Association that will never again be filled. I feel that my humble abilities are inadequate to accord the meed of justice that his memory deserves, though my heart proclaims his worth and our great loss in language more deep and more eloquent than words. The sunshine of his marked personality and his genial ways to those who knew him is forever extinguished. No longer shall the accents of his voice, ever freighted with wisdom and goodly advice, be heard at our council board, and as we instinctively turn to meet a once familiar form (not to these counterfeit presentments that are before us), absence only too pathetically and truly reminds us that of him there are written and inscribed on the silent tablets of memory images and precious thoughts that shall not die, and cannot be effaced or destroyed.

Dr. Horton: Mr. President, I rise to second the motion to adopt

these resolutions, and from my personal knowledge to indorse what the Committee has said of Dr. Atkinson. I know the language they use in describing his character is no exaggeration, and I can supplement that with the language the poet used in regard to the immortal Sheridan :

"The flash of wit, the bright intelligence,
The beam of song, the blaze of eloquence,
Set with their sun,
But they have left behind
The product of an immortal mind."

Dr. Barrett : I cannot let this occasion pass without paying a very brief tribute of respect to the memory of Dr. Atkinson. I never yet met the man with whom I could agree in all things, and I trust that I may never meet him. I cannot appreciate a man who will not be an honest, conscientious antagonist. Dr. Atkinson was a magnificent fighter. I mean it in its most complimentary sense. He was one with whom you could differ upon scientific or other subjects, and immediately at the close of the most earnest discussion he could take you in his arms as kindly as though you were his beloved child. There was never a sediment of bitterness left, nor did one feel that there was a diminution of personal respect and regard. We who have known him so well, have met with him so long, from year to year when we come together in our annual conventions will mark the vacant seat, and with a pang remember the days that were, but which shall be never, ah, never again ! I know that this Association will go on with its work as before. I know that professional intercourse shall not cease, and that brother shall continue to rejoice with brother. I know that others will step into his place and the ranks shall be closed up. The scenes that have known him so well will still continue, even though earth knows him no more forever. But we in whose hearts he has so long had a place, shall never cease to revere his memory.

"And the stately ships go on
To their haven under the hill ;
But oh for the touch of a vanished hand,
And the sound of a voice that is still !"

Dr. Butler : Those who were present two years ago in this room will recollect that Dr. Atkinson, who was the first elected President of this Association, occupied the chair for a brief time, and it occurred in this wise. Being your presiding officer at that time, it occurred to me that possibly it would be the last opportunity that he would have to

preside over this body, and therefore I took the liberty to invite him to occupy the chair, instead of one of the Vice-Presidents, during the reading of the President's address. I only refer to this to show that I had a strong conviction at that time that the doctor's work was fast drawing to a close. I do not feel that it would be right to allow this occasion to pass without speaking of his kindness to me personally, and I want to bear my tribute to his memory at this time.

Dr. W. H. Morgan: I have known Dr. Atkinson for thirty-three years. He was my friend, and to-night memories of him

"Come over my heart
Like an echo bland,
Like a gentle voice from a fairy land,
On balmy breezes borne to the strand
Of memory's sea.

"And it is sweet, as the night comes on,
To muse over this friend
Who is past and gone,
And to know that he lives in memory bright,
And will not depart till the stilly night
Has set forever."

Dr. Crawford: I have the honor of paying a tribute to the memory of this distinguished character. I want to say that he never came in contact with any man upon whom and over whom he had a greater influence than myself. His enthusiasm, and particularly that earnest desire of his that he always expressed to me, and in my presence, of being in search after truth, drew me to him as no other man of my profession has ever drawn me, from an intellectual standpoint. I want to say that I appreciate what he has done for dentistry, and I simply rise to return in public my thanks for having been permitted to come in contact with a character so exalted.

Dr. Patterson: If there is anything that distinguishes a professional man from those in other walks of life, it is that everything he has he gives freely to all. Such a man was Dr. Atkinson.

Dr. Stockton: I think if our dear departed friend can realize, as he thought so often he did, that the spirits were about him, with what joy and gladness does his heart rejoice to-night. I want to say just one thing. As I sat in the corridor at Excelsior Springs last summer, I heard one gentleman say to another, "Look at him, look at him well, for you will never see him or his like again." And so I say to-night, we will never see his like again.

Dr. Corydon Palmer: After the beautiful address of President

Harlan, I feel that I can hardly allow this opportunity to pass without adding my tribute to our departed friend. I knew him from the first meeting in which he spoke, and was by him helped to a comprehension of his fine theories, and I have been sorely grieved that some of the reports in the journals have not done him justice. What they have said was very well, but they have not told all that they should. Dr. Atkinson gave us the first free teaching that we ever had. Where was there ever a man in our profession who gave a clinic before an open meeting, until Dr. Atkinson did it? Where was there one who opened his doors wide and said, "Come in and see how I do it," until he set the example? Who ever before him told us how to perform operations? I feel at liberty to say, without disparagement to other noble men who are teaching, that Dr. Atkinson did more for the advancement of his profession than any other man either before him or during his time. Dentistry, before he began to teach, was a secret art. I know, for I began practice about the same time that Dr. Atkinson did, in 1839. There was then no regular way to get a knowledge of dentistry. What one learned he had to pick up the best way he could. Notwithstanding these difficulties, there was a great number of good and noble men early in practice whose taste for fine work led them to dentistry. Many of these, who were all self-made because they had to be, have passed away; some of them are still active.

Dr. Atkinson was first a medical man. When he adopted dentistry as his profession, the opportunities for tuition were few, and it was because of this that his inspirational teaching began to be developed. He gave us the use of the mallet, and showed how with it and the help of cohesive gold it was possible to form even a hollow crown, and to nicely restore the natural forms of the teeth, and he designed the first and best forms of instruments for doing it. He gave us a new and the best treatment for the diseases of the hard and soft tissues of the mouth to restore them to healthfulness; showed actual cases where reproduction of bone had taken place under his treatment, and invited all to come and learn freely how it was done. He labored to prompt the dentists to study the beginnings of life, to learn how the teeth and hard and soft tissues of the mouth are formed, and to-day the profession of dentistry is indebted to him for a better nomenclature and a higher standard of fees. Bless his memory! His work was nobly done, and he has gone to that bright summer land for which he had a glorious and abiding hope, where amid flowers, bright streams, and sunny banks we all may hope to meet our dear departed friend, and dwell together in fond remembrance of the past forever.

Dr. Dwinelle: It was my misfortune not to be here in season to hear the report of the Committee. Our societies of the East have made our tributes, one and another, to the memory of Dr. Atkinson. We have exhausted our command of language to express the virtues and excellences of our brother, and yet we feel that all has not been expressed. It is sufficient for me to say, that everything that I have heard, either upon this or upon other occasions, in reference to Dr. Atkinson is due to him, every word. I did not know him until recently, although I have known him in a certain sense for many years, but only within the last two or three years have I been brought very near to him, and I have the greatest respect for his character and for his attainments, and indorse everything that has been said in reference to our obligations to him. It is unnecessary to use any further language, so far as I am concerned, to his memory. It is oftentimes our experience that we can sometimes in ten minutes acquire more knowledge of a man than under other circumstances by an acquaintance of many years. In conclusion, I indorse everything that has been said in approval of his life and character. "None knew him but to love him, none named him but to praise."

JAMES W. WHITE, M.D., D.D.S., A.M.

Died, at his home in Philadelphia, May 27, 1891, of heart-failure, James W. White, M.D., D.D.S., A.M., in the sixty-fifth year of his age.

Although he had been annoyed by different attacks of rheumatic pharyngitis for several years, his death was sudden and unexpected. While the years he lived were not many in number, his life as numbered in deeds was one of the longest. And it lessens the shock and pain on his removal to know that he was spared a bed of pain and suffering.

Dr. White was born in 1826, descended on both sides from good old family stock. His father dying when he was only four years old, his educational advantages were few, and he was truly a self-educated man in the highest sense of the term. Whatever he read, whatever he learned, was labeled and placed in his mind in an orderly manner, ready for use at an instant's notice. As a writer he was unexcelled for his faculty of condensation, and his descriptive ability. His knowledge on any subject was exhaustive; whatever subject he pursued he learned it thoroughly, through and through. His reputation as a scientist and a physician was also of the highest. His contributions to dentistry were many and varied; he was the highest authority in the world on such subjects as diseases incident to dentition and the relations the teeth bear to the entire organism.

But he was perhaps more widely known as editor of the *Dental Cosmos*, a position for which he was especially fitted. He did not regard a journal as a stand for the display of past and present events, merely a statement of what had occurred, but he viewed it in the light of a teacher, which should direct the minds of the readers to a higher plane, that was always advancing higher, thus stimulating them to renewed energy.

His connections with The S. S. White Dental Manufacturing Company were of long standing; he was present at its beginning, and watched and helped it grow until it became the largest company of its kind in the world.

He was a man of unusually well-rounded principles, liberal in all subjects, professional, religious, and social.

He was identified with many philanthropic movements, giving his time, his talents, his money, willingly, cheerfully, and unassumingly.

Many will mourn his death,—the poor and oppressed, for they have lost a benefactor; the medical profession, for it has lost one of its brightest members; humanity, because a great and good man has gone. But a life such as his, serves as a stimulus to all others to do what he has done, to be what he has been.

While not a member of this society, the late Dr. James W. White was one of its constant visitors. His genial and kindly ways, his wise counsel and business qualifications, were frequently called into requisition to aid in disposing of many trying questions.

And by his death this society has lost one of its best friends.

DR. C. W. LEWIS.

WHEREAS, Death has removed from this Association Dr. C. W. Lewis;

WHEREAS, He was one of its youngest members, full of promise, of a genial, cheerful disposition which had endeared him to those who knew him;

Resolved, That we desire to place on the records of this Association this memorial of our appreciation of his many good qualities, and acknowledge our humble submission to the Divine will.

REPORT OF SPECIAL COMMITTEE ON PRESIDENT'S ADDRESS.

YOUR Committee to which was referred so much of the President's address as contained recommendations for the action of the Association, begs leave to report as follows :

That since the adjournment of the Saratoga meeting and the reading of the report offered there, they have endeavored to act in accordance with the instructions contained in the following resolution, adopted at that time :

RESOLVED, That the Committee on Revision of the Constitution be continued, and that any suggestions proposed by members—received by the Committee within thirty days after the mailing of the report to members—may be incorporated in their final report, which will appear in the published Transactions ; and such publication shall be deemed a sufficient notice of proposed amendments, so that a vote may be taken upon them at the next annual meeting.

The report presented at Saratoga was printed, and mailed to every member of the Association August 19. The thirty days expired with the same day of September. The Committee of Publication notified us that unless our report was in their hands by the first of October, the publication of the Transactions must be delayed. We have not felt at liberty to incur this responsibility. But, because all communications between the members of the Committee must be through letters, the ten days allowed us were totally insufficient fully to digest the suggestions received. In this dilemma we have no choice but to return the report, substantially as made at Saratoga, claiming the privilege of presenting a more complete summary at the next annual meeting.

Careful consideration has led your Committee to the conclusion that in three particulars the present Constitution works unsatisfactorily. The complaints arise :

First. From the insufficiency of the Sections.

Second. From the demand for advance abstracts of the important papers to be presented at any meeting, that members may prepare themselves and thus be enabled to present something worthy the occasion.

Third. From the insufferable annoyance of the constant interference of business matters with the reading of papers and the discussion of scientific questions.

To remedy these things the Committee presents certain amendments. As there is a difference of opinion among members, it has been thought best to offer the several plans suggested as alternates, that the Association may choose that method which commends itself to the greatest number.

In the report, that which is now the organic law of the Association is printed in Roman letters. The amendments proposed by the Committee are in *italics*, while the alternates and the individual suggestions appear in smaller type.

The Committee will continue its labors during the year, and at the next annual meeting hopes to be able to present a more complete digest of the whole.

W. C. Barrett,
James Truman,
Frank Abbott,
Thos. Fillebrown,
H. B. Noble,
Committee.

CONSTITUTION.

ARTICLE I.

NAME.

This organization shall be known by the name of the American Dental Association.

ARTICLE II.

OBJECTS.

The object of this Association shall be to cultivate the science and art of dentistry and all its collateral branches, to elevate and sustain the professional character of dentists, to promote among them mutual improvement, social intercourse and good feeling, and collectively to represent and have cognizance of the common interests of the dental profession.

ARTICLE III.

MEMBERSHIP. NUMBER OF DELEGATES FROM LOCAL SOCIETIES.

Section 1. Each local society may send one for every five of its active members, and each dental college one from its Faculty, as delegates to this Association for one year, upon complying with the requirements of its Constitution; but no society shall be entitled to representation that does not adopt or substantially recognize its Code of Ethics.

EXPELLED MEMBERS.

SEC. 2. Any member of this Association being expelled or suspended from his local society, shall from that date cease to be a member of this body.

MEMBERS TO BE OF THREE CLASSES.

SEC. 3. The members of this Association shall be of three classes, viz: delegates, permanent, and honorary members; the two former classes having equal rights and privileges, except eligibility to office and membership of the Sections—none being eligible to hold office except permanent members; the latter class to consist of prominent, worthy members of the dental profession residing in foreign countries, who shall be elected by ballot.

MEMBERS TO BE OF THREE CLASSES.

Sec. 3. The members of this Association shall be of three classes, viz: delegates, permanent and honorary members; the two former classes having equal rights and privileges, except that none but permanent members shall be eligible to office. Honorary members shall consist of prominent, worthy members of the dental profession residing in foreign countries, who shall be elected by ballot.

ALTERNATE PROPOSED BY DR. TRUMAN:

MEMBERS.

SEC. 3. The members of this Association shall be of three classes, viz: delegates, permanent and honorary members; the two former classes having equal rights and privileges.

The origin of membership shall exist in the subordinate societies affiliating with this organization. These local societies may elect delegates to the American Dental Association upon the basis of three delegates to every twenty members belonging to the organization, and these shall be elected, one-third for two years, one-third for three years, and one-third for four years.

At the expiration of their various terms the delegates shall have the privilege of becoming permanent members.

Honorary membership shall consist of prominent and worthy members of the dental profession in this and foreign countries, the selection to be made and adopted by a two-thirds vote by ballot of this Association.

[NOTE.—If this reading be accepted, it will require that other Sections be changed to conform to it.]

DELEGATES.

SEC. 4. All delegates shall be practitioners of dentistry; they shall receive their appointment only from permanently organized dental societies and dental colleges, having definite conditions of membership other than pecuniary, which shall have been approved by the Executive Committee [*Council*], and a copy of which shall be in the hands of the Recording Secretary of this body.

This Association will receive no delegates who, since August, 1875, shall have entered the profession without having first graduated at some reputable dental or medical college.

PERMANENT MEMBERS.

SEC. 5. Permanent members shall consist of those who, having served one year as delegates and complied with the requirements of the Association, shall sign a statement in the book to be kept for that purpose, signifying to the Treasurer a desire for permanent membership. After the resignation of a

member has been accepted, the Association may, at any time thereafter, reinstate such member by unanimous consent.

SIGNING CONSTITUTION.

SEC. 6. Each new member, before voting or speaking on any subject before the meeting, shall sign these regulations, inscribing his name and the title and location of the institution from which he receives his appointment.

DUES.

SEC. 7. Five dollars shall be paid to the Treasurer by each member yearly, as dues, before he can be eligible to office, or to speak or vote on any subject before the Association; and in case the dues remain unpaid at the close of the second annual meeting thereafter, the name of any such delinquent shall be erased from the list of members without further action.

GIVING NAME ON RISING.

SEC. 8. No one shall be permitted to address the Association before giving his name and residence, which shall be distinctly announced from the chair; nor shall he speak more than twice, nor longer than fifteen minutes in all, unless by consent of the Association.

CONDUCT OF MEMBERS.

SEC. 9. Any act of special immorality or unprofessional conduct committed by a member of this Association shall be referred to the Executive Committee [*Council*], whose duty it shall be to thoroughly examine into the case, and report at the next meeting if the charges be sustained. Whereupon, by a vote, the offending member may be reprimanded or expelled, a two-thirds vote being required for expulsion, a majority being sufficient for reprimand.

ARTICLE IV.

TIME OF MEETINGS.

The regular meetings of the Association shall be held annually, and commence on the first Tuesday in August. The place of meeting shall be determined each year by vote of the Association. After the selection of a place of meeting there shall be appointed by the President, annually, a committee of three, residing at or near the place selected for the next meeting, whose duty it shall be to procure rooms for meetings, clinics, and for the exhibition of mechanical appliances, and to make such other local arrangements as may be needed for the Association. This committee shall act under the direction of the First Division of the Executive Committee.

ARTICLE IV.

TIME AND PLACE OF MEETINGS.

The regular meetings of the Association shall be held annually. The time and place of meeting shall be determined each year by vote of the Association. After the selection of a place of meeting, there shall be appointed by the President, annually, a committee of three, residing at or near the place selected for

the next meeting, whose duty it shall be to procure rooms for meetings and clinics, and to make such other local arrangements as may be needed for the Association. This committee shall act under the direction of the Executive Council.

ALTERNATE PROPOSED BY DR. FILLEBROWN :

ARTICLE IV.

TIME AND PLACE OF MEETINGS.

The regular meetings of the Association shall be held annually. The time and place of the meeting shall be determined each year by vote of the Association, except that the place of meeting shall be in the West in 1893; in Washington in 1894; in the South in 1895; in the East in 1896; and thereafter in the order named, meeting in Washington every fourth year.

There shall be appointed by the President, annually, a committee of three, residing at or near the place selected for the next meeting, whose duty it shall be to procure rooms for meetings and clinics, and to make such other local arrangements as may be needed for the Association. This committee shall act under the direction of the Executive Council.

ARTICLE V.

OFFICERS—HOW ELECTED.

SECTION 1. The officers of this Association shall be a President, two Vice-Presidents, Corresponding Secretary, Recording Secretary, Treasurer, and the Executive Committee, who shall be elected by ballot without nomination. The three names, or in case of a tie, the four names having the greatest number of votes, shall be the sole nominees in case of failure to elect on the first ballot, and a majority of all the votes cast for those names shall be necessary to a choice.

Each officer, except as otherwise provided, shall hold his appointment for one year, or until another is elected to succeed him.

PRESIDENT—DUTIES OF.

SEC. 2. The President shall preside according to parliamentary usage, as laid down in "Cushing's Manual" and the Rules of Order adopted by this Association.

VICE-PRESIDENTS—DUTIES OF.

SEC. 3. In the absence of the President, one of the Vice-Presidents shall perform the duties of the office, and in the absence of these officers a chairman *pro tem.* shall be appointed by the Executive Committee [*Council*].

CORRESPONDING SECRETARY—DUTIES OF.

SEC. 4. The Corresponding Secretary shall attend to the correspondence of the Association with the societies therein represented, and to correspondence with other scientific bodies as may be desirable.

RECORDING SECRETARY—DUTIES OF.

SEC. 5. The Recording Secretary shall keep accurate minutes of the proceedings of the Association, preserve the archives and unpublished documents, and attend to the other duties that pertain to his office. He shall be *ex officio* chairman of the Publication Committee, and shall see that due notice is given of the time and place of the meetings of the Association.

EXECUTIVE COMMITTEE.

SEC. 6. The Executive Committee shall be the business committee of the Association, and shall consist of nine members, to whom shall be referred all business not otherwise specially provided for. They shall report at each meeting, under the proper head, their doings for the current year.

SUB-COMMITTEES.—FIRST DIVISION: COMMITTEE OF ARRANGEMENTS.

Three members of this committee shall act as the Committee of Arrangements, and shall procure suitable accommodations for the meetings and clinics, and for the exhibition and examination of appliances, of which they shall have the charge. These three shall attend generally to the wants of the Association during its session.

SECOND DIVISION: CREDENTIALS AND AUDITING COMMITTEE.

Other three shall examine and verify the credentials and qualifications of members, including all violations of the Code of Ethics and the Constitution, and shall also be the Auditing Committee for that year.

THIRD DIVISION: COMMITTEE ON VOLUNTEER ESSAYS.

The remaining three shall examine all volunteer essays, and before they are read to the Association shall give their approval, in order that time may not be taken up by unworthy or irrelevant matter.

They shall report the names of places for the next meeting.

PUBLICATION COMMITTEE—HOW APPOINTED.

The President shall appoint two members of this Association, who shall act in conjunction with the Recording Secretary as the Publication Committee. They shall be authorized to employ a competent reporter to furnish an accurate report of the proceedings of each meeting.

INSTRUCTIONS TO THE PUBLICATION COMMITTEE.

They shall superintend the publication and distribution of such portions of the Transactions as the Association may direct, or the committee judge to be of sufficient value. They shall specify in the annual report of this committee the character and cost of the publications of the Association during the year, and the number of copies still on hand. Any report or other paper to be entitled to publication in the volume of the Transactions for the year in which it shall be presented to the Association, must be placed in the hands of the Publication Committee on or before the first day of September, and must also be so prepared that the proof-sheets furnished the authors shall be returned to the committee without material alteration or addition.

Every paper received by this Association, and all plates or other means of illustration, shall be considered the exclusive property of the Association, and shall be published for its benefit.

DISCLAIMER.

This committee is hereby instructed to print at the beginning of each volume of the Transactions the following disclaimer, viz: "The American Dental Association, although formally accepting and publishing the reports of the

various Standing Committees, and the essays read before the Association, holds itself wholly irresponsible for the opinions, theories, or criticisms therein contained, except when otherwise decided by special resolution."

REPORTS OF SUB-COMMITTEES.

Each of these sub-committees shall report from time to time, as may be necessary, to the Executive Committee as a whole, who shall decide upon such report, if possible ; but in case of their inability to decide upon any matter, it shall be brought before the Association for its decision as early as practicable.

CLASSIFICATION OF EXECUTIVE COMMITTEE.

At the first election of this committee, the first three shall be elected to serve three years, the second three for two years, and the last three for one year, and thenceforward three new members shall be elected each year by ballot, to serve three years, and in case of the absence of any member of this committee his place may be temporarily filled by the remaining members of the committee.

MEETINGS OF EXECUTIVE COMMITTEE.

The Executive Committee shall, if possible, meet for consultation and arrangement of their respective duties on the day preceding the annual meeting of the Association, and shall meet for the examination of credentials, the arrangement of appliances, and the reception of papers, and such other business as may properly come before them, at 8 A.M. on the day of the annual meeting.

SUBDIVISION OF EXECUTIVE COMMITTEE.

They shall also meet after the election of new members to the committee to choose their own chairman and secretary, and to divide themselves into sub-committees as hereinbefore provided, and for the purposes described.

CHAIRMAN MAY CONVENE THE COMMITTEE.

The chairman of this committee may at his own discretion summon the members thereof to a meeting at any suitable hour during the sessions of the Association, and at any other time at the request of five members of the committee.

TREASURER TO ATTEND TO RECEIVE DUES AT 8 A.M.

SEC. 7. The Treasurer shall hold all the moneys belonging to the Association, and shall keep an accurate account as between the society and its members. He shall attend the meeting of the Executive Committee at 8 A.M. on the day of the annual meeting to receive dues, and shall attend at roll-call to verify the list of names, checking all such as are in arrears for dues ; he shall restore such names upon payment of dues within the legal limits, and shall notify all whose names may be erased from the list of membership. He shall pay the drafts of the President, countersigned by the Secretary, upon vote of the society only, and shall report to the Executive Committee, where his accounts shall be audited and by whom his report shall be presented to the Association, together with their own.

All resolutions appropriating money, except for the legitimate expenses of this Association, shall require a two-thirds vote of all the members present.

ARTICLE V.

OFFICERS.

SECTION 1. *The officers of this Association shall be a President, two Vice-Presidents, Corresponding Secretary, Recording Secretary, Treasurer, and an Executive Council.*

The Executive Council shall be the Business Committee of the Association, and shall consist of twelve active members, of which the President, Secretary, and Treasurer of the Association shall constitute a part, and these shall be the officers of the Executive Council, which shall be competent to provide rules for its own government.

Sections 2, 3, 4, and 5 are left unchanged.

SEC. 6. *All officers of the Association shall be elected by ballot without nomination. The three names, or in case of a tie, the four names having the greatest number of votes, shall be the sole nominees in case of failure to elect on the first ballot, and a majority of all the votes cast for those names shall be necessary to a choice.*

Each officer, except as otherwise provided, shall hold his appointment for one year, or until another is elected to succeed him.

ALTERNATE PROPOSED BY DR. BARRETT :

SEC. 6. The Executive Council shall elect all officers of the Association.

ALTERNATE PROPOSED BY DR. ABBOTT :

SEC. 6. The President, Vice-Presidents, and members of the Executive Council shall be elected by ballot, in open session of the Association.

The candidates for President and Vice-Presidents shall be nominated by an informal ballot of the Association. The three names, or in case of a tie, the four names having the greatest number of votes, shall be the sole nominees.

A formal ballot shall then be taken, in which a majority of the ballots cast shall be necessary to a choice.

The informal ballot may be made formal by a three-fourths vote of the members present.

All other officers shall be elected by ballot by the Executive Council.

ALTERNATE PROPOSED BY DR. BARRETT :

SEC. 6. At the first election held under this Amended Constitution, and at each subsequent election, the President shall appoint a nominating committee of three members, who shall at the time fixed for election submit the name of an active member for President, and those of three for members of the Executive Council, and the society shall at once proceed by ballot, and separately, either to confirm or reject them. If the society fail to confirm either, then the nominating committee shall at once proceed to name others in their place, and so continue until one is chosen for each position. The nominating committee shall, when practicable, be named at the first session. All other officers of the Association shall be elected by ballot, by the Executive Council.

TERMS OF OFFICE.

SEC. 7. *The terms of office of President, Vice-Presidents, Corresponding Secretary, Recording Secretary, and Treasurer shall be one year, or until their successors shall have been elected and installed. That of members of the Executive Council shall be three years, and their terms of office shall be so arranged as that three of them shall expire each year. The present members of the Executive Committee shall be members of the Executive Council.*

QUORUM OF EXECUTIVE COUNCIL.

Seven members of the Executive Council shall constitute a quorum. If at any annual meeting a quorum shall not be in attendance, the members of the Council present shall appoint enough members of the society who are present to constitute a quorum, and such members so appointed shall serve until the arrival of the regular members of the Council in whose places they were appointed.

REGULAR AND SPECIAL SESSIONS.

SEC. 8. *The regular sessions of the Association shall be held in the morning and the evening. No business aside from that of the reading of papers, the reports of officers and Standing Committees, and the discussion of scientific and professional subjects shall be introduced at the regular sessions.*

Upon the afternoon of the third day of the annual meeting, a special session shall be held for the election of officers, the fixing of a time and place for the next annual meeting, and the transaction of such other business as may be necessary or expedient.

Special sessions may be called by the Executive Council upon the afternoon of any other day of the meeting, for the transaction of business.

ARTICLE VI.

SECTION 1. To prepare, arrange, and expedite business, this Association shall be divided into seven Sections, as follows:

1. Prosthetic Dentistry, Metallurgy, and Chemistry.
2. Dental Education, Literature, and Nomenclature.
3. Operative Dentistry.
4. Histology and Microscopy.
5. Materia Medica and Therapeutics.
6. Physiology and Etiology.
7. Anatomy, Pathology, and Surgery.

SEC. 2. It shall be the duty of each member to identify himself with one or more of the above-named Sections, and he shall inform the Recording Secretary of his choice at the time of joining the Association. At the close of the morning session of the second day of the annual meeting, the roll of permanent members in good standing shall be called for the annual reorganization of the Sections.

SEC. 3. It shall be the duty of the Recording Secretary, immediately before the close of the above morning session of the second day, to make out lists of the names thus furnished of each Section, as a basis for the election of officers of said Section, whereupon the Sections shall immediately proceed to the election of chairmen and such other officers as they may see fit.

SEC. 4. The chairman shall preside at all meetings of his Section; shall exercise general supervision over the business, and shall see that the labors of his Section are conducted in the manner calculated to secure the best results. The chairman, or such other member or members as the Section shall select, shall prepare and read at the annual meeting of the Association next ensuing a paper or papers on the advances and discoveries of the past year in the branches included in the Section. The reading of such papers shall not together occupy more than forty minutes.

SEC. 5. The several Sections shall meet at 10 A.M. on the morning of the first day of the annual meeting of the Association.

SEC. 6. For the information of all members, a list of the members of each Section shall be published in the Transactions of each year.

ARTICLE VI.

SUPERVISORY COMMITTEE.

SECTION 1. *The Executive Council, before the close of each meeting, shall appoint a Supervisory Committee of Work, consisting of five members, to whom shall be referred all papers of a professional and scientific nature, and all appliances and improvements in dentistry. Such papers, with a full account and description of such appliances and inventions, if a full discussion of their merits is desired, shall be in the hands of such general committee at least thirty days before the time for the annual meeting. The committee may, in their discretion, prepare an abstract of such papers and have it printed and forwarded to each member of the committees of the Sections, and to such other members of the Association as they shall deem proper, at least ten days before the time for the annual meeting.*

All papers, appliances and improvements, models, or illustrations of devices that may be received by the Supervisory Committee of Work, if approved by them, shall be referred to the appropriate Section committee for presentation in the regular report. The members of this committee shall hold no other office in the Association.

The terms of office of the members of such committee shall be five years, and they shall be so arranged that one shall go out each year. The senior member shall be Chairman of the committee, and the next in seniority shall be the Secretary.

In case any member of such Committee shall be unable properly to discharge the duties of his position, by reason of removal from the country, sickness, or any other sufficient cause, or if there be a persistent neglect of such duties, the Executive Council at any regular meeting may declare a vacancy, and proceed to fill it by the appointment of another member.

SECTIONS.

SEC. 2. *To further expedite the scientific work of the Association, the Executive Council shall appoint a committee of three for each of the following Sections:*

1. *Prosthetic Dentistry, Metallurgy, and Chemistry.*
2. *Dental Education, Literature, and Nomenclature.*
3. *Operative Dentistry.*
4. *Histology and Microscopy.*
5. *Materia Medica and Therapeutics.*
6. *Physiology and Etiology.*
7. *Anatomy, Pathology, and Surgery.*

The terms of office of the members of such committee shall be three years, and they shall be so arranged that one shall expire each year. The senior

member shall be the Chairman, and the next in seniority the Secretary of such committee.

The committees so appointed and organized shall have charge of the work in their several Sections, and shall submit at each annual meeting a report comprising a full account of the status, advancement, and improvements made in their respective fields, and also such papers, or parts of papers, as shall have been referred to them by the Supervisory Committee of Work.

Vacancies in such Committee may be declared and filled by the Executive Council, for the reasons and in the manner prescribed in Section 1 of this Article.

ARTICLE VII.

QUORUM.

Fifteen members shall constitute a quorum for the transaction of business in this Association.

ARTICLE VIII.

SUSPENSION OF RULES. THREE-FOURTHS TO VOTE.

The regular order of business may be temporarily suspended by a three-fourths vote of all the members present, for the consideration of a specific subject, upon the completion of which the regular order shall be at once resumed.

ANNUAL ADDRESS.

By A. W. HARLAN, President.

THE American Dental Association convenes to-day in its thirty-first annual meeting. For the first time in its history we miss the familiar face and form of our lamented first-elected President, Dr. William H. Atkinson, of New York, who died April 2, 1891. Dr. Atkinson was one of the most conspicuous figures in this body from the earliest period of its existence until our last annual meeting. It is not saying too much of him to say that he did as much—nay, more—for the building up of this Association than any other single member whose name could be mentioned. It is a matter of personal sorrow, I have no doubt, to everyone here assembled to find that his place is vacant, and that we shall see his face no more. "Peace to his ashes."

During the year other eminent and useful members of this profession have departed, the most notable that I may mention being Dr. Edward Maynard, of Washington,—a man who entered upon the practice of dentistry before dental colleges were established in this country, and one who not alone gave of his best thoughts to the profession of his choice, but who was eminent in other departments of life.

Dr. Maynard was a recognized inventor, and not the least of his inventions were those relating to the development of firearms. He was never a member of this Association, but was always a consistent and progressive member of the profession, and we feel that it has lost one of the most conspicuous examples of the attainment of knowledge under great difficulties. Dr. Maynard entered upon the practice of dentistry at a period when private office instruction was the sole means of gaining the technique of dental practice, and from the fewness of liberal-minded teachers and the little knowledge that he could gain at that time, he practically evolved the perfected system of soft gold filling, which to-day is one of our best recognized methods of practice.

Dr. J. W. White, the eminent editor of the *Dental Cosmos* for

a period of a whole generation nearly, has also departed. Dr. White was a faithful attendant upon the meetings of this Association in his capacity as a journalist, and to his great interest in this Association we are indebted for the splendid line of Transactions for many years past. Dr. White combined great business ability with rare tact, and was one of the few truly well qualified dental editors of this country. We feel that in mentioning his loss we also speak the sentiments of the members of this Association when we say that his is a place that will not be easy to fill, either in the journalistic world, or as the head of the great house of which he had acted as President since the death of its founder.

The President of this Association feels to-day that there are some topics which may be briefly touched upon relative to its future usefulness and progress. One of the things to which your particular attention is directed is the method of doing scientific work under the head of Sections.

In 1878 it was thought best by this Association to abolish the whole system of Standing Committees. At that time the minority report of the Committee having the matter in charge was adopted, so that we have had a period of a dozen years or more working under the new régime. A glance at the Transactions during that period will show, if they are studied carefully, that nearly all, if not the whole, work in many of the Sections has devolved upon the Chairmen. The Section system in an Association no larger than this seems to your presiding officer unsuited to the securing of the best scientific work. It makes it incumbent upon the Chairman to assume the whole responsibility, and it has a tendency to stifle individual workers who are compelled to present their productions to the meetings of Sections. If, unfortunately, there should be any personal ill-feeling existing among any of the members of a Section toward the author of a paper, it may happen, and it has happened, that papers have been suppressed and have never reached the Association. If it were possible at this time to devise some plan whereby papers for discussion could be secured without the necessity of the author presenting his paper to a slimly-attended Section meeting, it no doubt would be of great benefit to all. The President would respectfully recommend that a Committee be appointed to inquire into the matter and see if an improvement in this respect cannot be made so as to become effective at the next annual meeting.

Another thing that your President would speak of as affecting the interest of Sections would be this, that there should be a more general

rotation in the filling of the offices of Chairman and Secretary of Sections, if the Association should see fit to continue doing its work by Sections. It would increase the number of active workers in the Sections. At the present time I know of my own knowledge that the Chairman and Secretary of some Sections have been in office for from three to five and even more years, and it seems that this continual keeping of the same persons in office has a tendency to detract materially from the working capacity of the Sections. The President speaks feelingly on this subject, because he himself has occupied the position of Chairman of Section V from 1882 until the present time; although he has desired a rotation and the infusion of new blood into the Section, the members have thought otherwise, and hence he has filled this office with great reluctance. If it were possible to have a change of officers of Sections at least once in two years, it would increase the number of workers and place the responsibility on a greater number of men, thereby securing more varied scientific work to be presented to this body.

Another thing, which the President of last year touched upon slightly, is the method of doing the miscellaneous business of the Association. At a late period in the history of that meeting a Committee was appointed to devise ways and means for the transfer or methodical arrangement of business matters belonging to the Association, to divorce them from the scientific work. From a knowledge of the workings of the Odontological Society of Great Britain, of the British Dental Association, the American Medical Association, the Illinois State Dental Society, the Ohio State Dental Society, and other societies in the United States, the plan of having an Executive Council to perform all of the strictly business work of the Association would seem a desirable one for this body. Such a method would leave the society free to devote itself entirely to the reading of papers and the discussion of the same. If this Association will seriously consider the matter of placing the whole of its business affairs in the hands of its present Executive Committee, so that the time of the Association will not be taken up by trivial discussion or parliamentary tactics by those who have a fondness for that kind of work, it seems that much more and better scientific work will be accomplished.

Another point to which I would call your attention is the time of meeting of this Association. In order to be a truly American Dental Association, it should be possible for us to meet at any point in the United States, but under our present Constitution it is impossible that these meetings should be convened at any point south of Mason and

Dixon's line at the date now permanently fixed for our annual sessions. We recognize that there is a field for the existence of the Southern Dental Association; that there is also a field for the creation of a Western Dental Association; that there is a field that might be carefully cultivated for the formation of an Eastern Dental Society. But in spite of the growth perhaps of three great Associations such as these should be, the one which we are most interested in—the American Dental Association—should have the time of its meeting so fixed that if need be it might convene in Atlanta, Nashville, New Orleans, Denver, or Portland, Me., at a time of the year when it would be most convenient for the greatest number to attend its sessions. As it is now, the rule is arbitrary: we must meet the first Tuesday in August of every year.

If you will consider this for a moment, it may be seen how quickly and how certainly our membership might be largely increased by holding meetings at other times or in other seasons, when it would be possible to go into a territory wherein it has never been practicable for us to meet. It only requires an amendment to the Constitution, making it possible for the members assembled at any one meeting to determine the time and place of the next meeting. If the Association delegates its business to the Executive Committee and gives them the power to effect this change, it is expected that the membership will be largely increased during the next ten years.

The question of increasing the interest in the annual meetings is one which has been in my mind for several years. A few years ago it was the custom of this body to appoint some of its members to visit State and local dental societies, and to visit localities where no dental associations were in existence. Since a change has taken place in the political history of this country by the addition of new States,—Idaho, Montana, Washington, Wyoming, the two Dakotas, with the possibility of others being added in the near future,—we should make an effort to see that State dental societies at least are organized in every State and Territory where none are now in existence.

It would also seem to be a matter of interest that local dental societies should be established in cities and towns of twenty-five thousand to fifty thousand inhabitants and upward where none are now located. In other cases where State societies are weak numerically, and the members of the profession in those States are not conversant with the methods of providing attractive programmes of scientific work, it might be well to appoint boards of visitors, consisting of three members residing at a convenient distance from such localities,

so that it would not be expensive for them to attend meetings, and infuse new life in societies where they are more or less moribund at the present time. This is a matter to which I would call your especial attention, and urge immediate action. This is the more important in view of the fact that at our last annual meeting a resolution was adopted conjointly with one that had previously been adopted by the Southern Dental Association, appointing a General Executive Committee for the purpose of organizing the World's Columbian Dental Meeting in Chicago in 1893. By the generous distribution of funds, wherever needed for the purpose of awakening the members of the dental profession throughout the United States to the importance of this proposed meeting, we will accomplish a double object: (1) Secure a larger membership for local societies and State societies, and increased interest in the same. (2) By so doing we will assure for the projectors of the World's Columbian Dental Meeting very full and cordial support. This proposed meeting to be held in Chicago is now well under way. The General Executive Committee held their preliminary meeting, as many of you know, at Excelsior Springs, Mo., last year, and during the past winter a meeting was held in Washington. Various committees have been appointed and are earnestly at work to make this a splendid success. It only devolves upon you to give these committees cordial support and to afford them every facility to secure not only the best efforts of our best men in the production of papers, but to make a series of instructive clinics, and an exhibition before the people of the world who will visit Chicago in 1893, astounded at the progress of American dentistry and American dental surgery. From correspondence with members of the profession and personal interviews with many of them since the General Executive Committee for this meeting was appointed, I am assured that the most cordial and hearty co-operation will be given to the undertaking from members of the profession residing in foreign countries. Everyone seems pleased at the thought that there will be a grand convocation of dentists in the United States, and coming, as it does, at a time of the year and in a city so well advertised and so well known for its hospitality as Chicago, it seems as though this would be an occasion never to be forgotten.

The Association has cause for felicitation to-day in the fact that at the beginning of the fall sessions of our colleges a three-year course becomes obligatory. During the whole of its existence it has agitated the question of a better dental education for future practitioners of dentistry, and after a period of nearly thirty years the older members at least are seeing the fruits of this continual agitation of

dental college education. We think that in view of the fact that all of the colleges have fallen into line so easily and gracefully, everything bids fair to make this new departure a firm fixture, and it cannot be said that to be an American dentist means to be a poorly educated dentist, because after the student has attended three full college terms in one of our American dental colleges, with the advantages of the excellent clinical instruction that he will receive, he will compare favorably with the students of any college, no matter whether it is located across the waters or in contiguous lands on this continent. The Association, therefore, is to be congratulated upon the successful accomplishment of this move in the direction of true professional progress, and it is to be hoped that this and other matters dear to the hearts of our progressive men will not result in a fruitless attempt to improve our scientific status.

SECTION VI.

Physiology and Etiology.

Report by H. A. SMITH, Chairman of the Section.

Mr. President and Gentlemen of the Association :

The Chairman of Section VI, Physiology and Etiology, desires to present the following report :

At the annual meeting two years ago this Section was empowered to procure the examination of pre-historic crania, and an appropriation of money was made for that purpose. At the last meeting of the Association, Dr. J. J. R. Patrick, a member of the Section, was selected to prepare tables and act as Curator of the proposed examinations. Under Dr. Patrick's direction during the year, partial examinations of collections of crania in Washington, Philadelphia, Boston, and the Curator's own valuable collection in Belleville, Ill., have been made. A brief report of the progress made in the work of tabulation will be made by Dr. Patrick. Members of Section VI express the hope that the work already done in cranial investigation will meet the approval of members of the Association when they shall have opportunity of examination.

Statement as to funds :

Amount appropriated 1889		$500.00
" received from Kentucky State Dental Society		50.00
" " " Georgia State Dental Society		25.00
		$575.00
Amount expended by Dr. J. J. R. Patrick	$511.75	
" previously expended	50.00	
		$561.75
Balance		$13.25

We have also to report that the following papers have been submitted to the Section, and recommend that they be read :

"Mouth-Breathing not the Cause of Contracted Jaws or High Vaults," by Dr. Eugene S. Talbot, of Illinois; "Physiological Action of Obtundents," by Dr. L. E. Custer, of Ohio; "Diseases of the Oral Mucous Membrane," by Dr. J. D. Patterson, of Missouri; "Dentition of the Felidæ," by Dr. A. H. Thompson, of Kansas, to be read by Professor Peirce; "Phagocytosis," by Dr. H. A. Smith, of Ohio; and a continuation of the Section's annual report on "Dental Implantation," by Dr. Louis Ottofy, of Illinois.

SECTION VI.—Continued.

Dental Implantation.

Report by LOUIS OTTOFY, Secretary of the Section.

THE Section still continues its observation regarding the erstwhile so popular operation of implantation. The practice has re-awakened interest in the subject of transplantation under modern antiseptic precautions.

At the present time the following statement regarding the subject of plantation of teeth may be considered a conservative view :

1. In properly selected cases implantation is successful for a period of from three to five years.

2. No other operation in dentistry equals in beauty, service, natural appearance and perfect comfort, successfully implanted teeth.

3. No disease has ever been transmitted by implantation.

4. A combination of transplantation and implantation will often enable the dentist to make good use of an otherwise worthless socket of a tooth lost on account of calculus, pyorrhea, or other causes.

We believe that the profession is justified in performing this operation in suitable cases, inasmuch as the chances of success are favorable when a healthy tooth is implanted.

SECTION VI.—Continued.

Mouth-Breathing not the Cause of Contracted Jaws and High Vaults.

Paper by EUGENE S. TALBOT, of the Section.

MOUTH-BREATHING was unknown among the early races, and is not observed in the present modern, uncivilized pure races. This may also be said of deformities of the maxillæ and teeth. It will be admitted, however, that mouth-breathing and also irregularities of the jaws and teeth are becoming very frequent among our own people, and it is a reasonable supposition that the causes which would produce the one condition must necessarily in many cases produce the other.

In an otherwise logical essay upon the subject of "The Influence of Adenoid Hypertrophy at the Vault of the Pharynx upon the Development of the Hard Palate," read before the New York Odontological Society, November 16, 1890, by Dr. D. Bryson Delavan, the author speaks of mouth-breathing as a cause. He says, "The mouth-breathing habit compels the constant dropping of the lower jaw, which, hanging by the cheek from the superior maxilla, causes constant pressure upon the upper jaw. This produces flattening of the lateral alveolar arches and shortening of them, in consequence of which there is not sufficient space for the eruption of the canines when they are due, and they therefore grow forward."

Other authors mention the fact that sleeping with the mouth open produces tension of the buccinator muscle, this causing the jaws to contract; and they suggest different ingenious but sophistical theories to explain how this pressure may bring about the peculiar form of deformity. There are also very able specialists, teachers in our medical colleges, who are constantly bringing this theory before the students as a cause. Such instruction has a tendency to defeat scientific investigation as to the real causes of the true condition found in obstructions

of the nasal passages by assuming as the cause the apparent fact, namely, mouth-breathing. Students thus take it for granted that mouth-breathing is the cause, and the only cause, for this condition.

I will therefore direct attention to a few facts as they have been presented to me during a constant study of the deformities of the jaws and teeth for the past fourteen years.

In the first place, let us consider the parts involved. The superior maxillary bones are fused at the median line. Their under surfaces have imposed upon them the alveolar processes. Gray speaks of these two structures as one bone,—the superior maxillary bone ; but from the function, structure, and position of the alveolar process in its relation to the maxillary bone proper, they should be separately described as distinct bones. The maxillary bones proper are made up of dense, compact tissue, and are so arranged as to best resist certain forces. The outer surface of the bone is fortified and supported by the malar process, which is situated midway between the maxillary process and the canine eminence at the first permanent molar. At the canine eminence we have the strong, thick plate of bone extending from the bridge of the nose to the alæ, the mesial portion forming the outer surface of the nasal cavity. We also observe that the nasal septum is situated at the center of the nares and is attached to the maxillary bone at and along the place of union of the two halves of the maxillary bone. A saw passed through from one canine fossa to the other discloses in the section the strong trilateral pillars of bone which go to make up the outer surfaces of the nasal cavity. These strong pillars of bone are situated just at the point of the location of the permanent cuspids, and together with the nasal septum form a strong support to the hard palate.

The maxillary bones are for the attachment of muscles and the resistance of force in masticating food. The hard palate does not assume the normal shape until the twelfth year, or after the teeth are all in position. The vault may be high or low, ranging from one inch vertically from the alveolar plane on a transverse line intersecting the alveolar crests between the second bicuspids and first molars (which is the highest vault I have seen) down to one-quarter of an inch from the same plane, which is the lowest vault I have observed. In either case it may be normal, each variety depending upon the shape of the bones of the head for its peculiar form.

The alveolar process, on the other hand, is made up of soft cancellated structure, and is solely for the purpose of protecting the germs of the teeth before they have erupted, and for supporting the teeth

after they are in place in the jaw. From the time the teeth make their first appearance until they are finally shed, the alveolar process has developed and been absorbed three distinct times. The alveolar process being therefore solely for the protection and support of the teeth, it is logical to infer that the position and shape of the alveolar process depend upon the location of the teeth. The bone proper, therefore, as we shall see later, is not influenced to any great extent by the movement of the teeth.

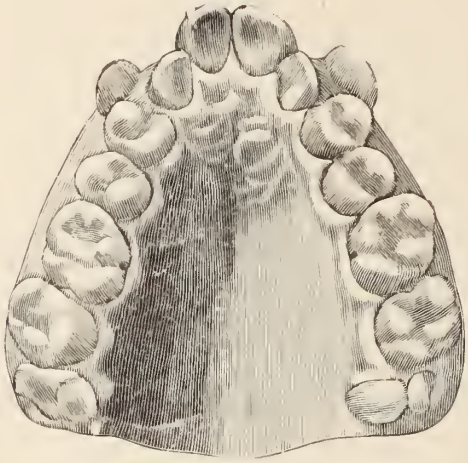
The buccinator muscle is composed of striated muscular fibers, and is therefore under the control of the will. It is penniform in shape. It has its origin and insertion along the body of the jaws, above the alveolar process on the upper and below the alveolar process on the lower jaw. It extends from the first bicuspid anteriorly to the wisdom-tooth posteriorly. The center of the muscle in one direction therefore would be on a line with the grinding-surface of the teeth, and in a transverse direction at the first permanent molar. It serves to compress air in the act of blowing, whence its name. Its chief function is to convey and hold the food under the teeth during mastication.

There are many cases of contracted arches where mouth-breathing does not exist; there are also many cases of normal arches where it is present. As many are aware, mouth-breathing frequently commences very early in life; contracted jaws, on the other hand, never begin to form until the seventh or eighth, and in most cases the tenth year, except in cases of monstrosities, or from traumatic causes. When these conditions exist, they are wholly unlike the usual contracted arches and can be diagnosticated at once, and therefore they should not enter into this discussion. Contracted arches are of two kinds, V- (Fig. 1) and saddle-shaped (Fig. 2), all the other varieties being modifications and blendings of these two. It is apparent that the cause which produces the one does not produce the other. My observation has been that there are two-thirds more V- and saddle-shaped arches among the low vaults than among the high vaults, taking .58 of an inch as the average; but where one of these deformities exists with a high vault it is always more marked, for the reason that in the high vault the alveolar process is long and thin, with very little resistance, and the teeth are more easily carried in one direction or the other.

In the V-shaped arch, commencing at the first permanent molar, there is a gradual narrowing of the teeth-occupancy and alveolar process toward the median line, where the incisors may approximate a V point or may stand in their normal position to each other.

Invariably there is a protrusion of the teeth and alveolar process, and not of the jaw. On the other hand, in the saddle-shaped arch the bicuspids are carried inward and the deformity is invariably situated

FIG. 1.



between the first permanent molar and the cuspid. Unlike the V-shaped variety, the anterior teeth and alveolar process never protrude in this class of deformities. The contracted hard palate is

FIG. 2.

always associated with the V-shaped variety, and in most cases extends backward to the second bicuspid. It is never seen with the saddle-shaped variety.

The high vault is never seen in the first set of teeth, nor does it develop until the second set are all in place, which is at the twelfth year. The vault commences to slope slightly from the neck of the incisor until it reaches an imaginary line drawn across the roof of the mouth from the right first bicuspid to the left first bicuspid, and then it gradually or abruptly slopes upward until a point is reached which is central and vertical to a line drawn across the jaw from crest to crest between the second bicuspids and first molars. From this point posteriorly to the soft palate the dome is usually nearly level and parallel with the plane of the alveolar crests of the bicuspids and molars. Occasionally we see a slight relative depression and occasionally a corresponding slight elevation, but these are so inconsiderable as to escape notice unless one were looking for the peculiarity.

In mouth-breathing the lower jaw usually drops only sufficiently for the passage of the same volume of air that would pass through the nasal cavities, each of the openings to which is equal to only about one-half an inch in transverse area. Old people often sleep with the mouth open and frequently to the fullest extent, but these deformities of the jaws and teeth never occur after the eruption of the teeth, say at the twelfth or fifteenth year.

When one opens his mouth he is conscious of a tension of the orbicularis oris, but not of a pressure of the buccinator, no matter how wide the mouth may be opened. This muscle being under the control of the will, is always passive except in the act of blowing or eating; therefore contraction during sleep is wholly out of the question. As the buccinator muscle extends anteriorly to the first bicuspid only, it cannot be productive of the V-shaped variety of deformity, in which is also found the contracted vault. Therefore the only deformity that is likely to be so produced is the saddle-shaped variety, which is, in fact, out of the question for reasons which I shall explain later. The orbicularis oris muscle cannot produce the contraction, because when the mouth is open the pressure exerted on the six anterior teeth is backward. Thus the teeth should be carried in the opposite direction from that which must be taken to produce this deformity. Again, the pressure is just as great upon the incisors as upon the cuspids, thus holding them in place. More force is exerted by the orbicularis oris upon the six anterior teeth when the mouth is open than could be exerted, were it possible, by the buccinator muscle, which would tend to hold the anterior teeth in place. It has in years past been demonstrated by dentists in regulating teeth that it is very rare for the apices of the roots of teeth to move when pressure is brought to bear upon

their crowns for the purpose of regulating them. This being the case, teeth having long roots like the cuspids are less liable to move than teeth with short roots like the lateral incisors and bicuspids. Since in the moving of a tooth the greatest change which takes place is at the neck, it stands to reason that the greatest absorption and deposition of bone takes place at that point. The roots of the cuspids are larger and longer than those of any other teeth in the jaw ; unlike other teeth, the germs are situated considerably higher and farther toward the outside of the alveolar process, so that when they come closely into position they diverge from the apices to the crowns, while all the other teeth stand nearly or quite perpendicular, thus showing that the roots of these teeth do not influence the hard palate. I have shown that the first permanent molar and the teeth posterior to it are never involved. I have also shown that the center of the buccinator muscle in both directions is located at this tooth. How, then, is it possible, since all the teeth are covered by the muscle upon one side, that half are carried inward and the other half remain normal?

Again, if mouth-breathing is the cause of the contraction, both sides should contract alike, and the deformity be uniform upon both sides, which is never the case. Such muscles do not contract to a degree sufficient to induce the pressure necessary to produce a deformity. That they should, is inconsistent with our knowledge of the influence exerted by muscular structure in other parts of the body. Some of the muscles of the chest exert much more pressure in respiration than it is possible for the buccinator to do during sleep, yet no one would expect to find the ribs modified by this process. The pressure of the contractile tissue upon the crowns of teeth is not sufficient to affect the alveolar process through the roots of the teeth, but even if it could modify that spongy structure, its force would stop there and would not extend to the osseous vault and result in bending it out of shape. In most of these cases the diameter of the superior maxilla, its alveolar process and teeth, is less than that of the inferior maxilla, alveolar process, and teeth. This is always the case in the worst forms of irregularities. In such cases the muscles and cheek could not press upon the teeth and alveolar processes of the upper jaw. The changes which take place in the bone are not a bending in at one place and a forcing out at a weaker point to compensate for the space lost, but are an absorption and deposition of bone at the point of pressure. And even if such were the case, the strong pillar of bone situated at the very point of contraction of the alveolar process, together with the nasal septum, constitute a strong bulwark for re-

sistance to the pressure, which is suppositiously acting at a distance from the top of the vault. Again, it would be as impossible to so produce pressure sufficient to break the dental arch as it would be for the weight of a building to break the arch of a door or window. The tongue exerts a much greater force in the act of swallowing, and would prevent inward movement of the teeth if so slight a pressure as the muscles of the cheeks could exert were the cause of the deformity.

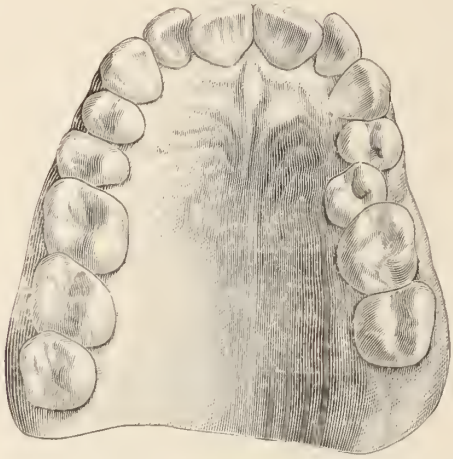
For the sake of the argument, let us suppose it were possible for the buccinator muscle to produce this contraction; we should then expect to find the modification of the osseous structures uniform. This would shut out semi-V-shaped (Fig. 3) and semi-saddle-shaped arches (Fig. 4) entirely, and a majority of other irregularities of the teeth in which there is bilateral asymmetry, for however much one

Fig. 3.

might incline to the prevalent theory, no one would dare to assert that the muscle will act on one side of the mouth, while that on the opposite side remains passive. Partial V-shaped (Fig. 5) and partial saddle-shaped (Fig. 6) arches make the theory still less tenable. In these varieties we meet with sudden bends inward where only one or two teeth may be involved, which aberrations could only be produced by a centralization of force on one given point or fiber of muscle, a peculiarity of function that has never yet been ascribed to muscles. The muscle being penniform in shape, it would be impossible for one or two fibers of the muscle to exert their influence upon a bicuspid. It would naturally lap over two or more teeth. Lastly, if the buccinator acts as all muscles do, uniformly throughout its extent of contraction, it is just as efficient below a median bisecting line in

producing a narrow, contracted arch as in its upper portion, and we should therefore expect to find the lower maxilla contracted whenever the upper one is, which is contrary to facts. A V-shaped arch can

FIG. 4.



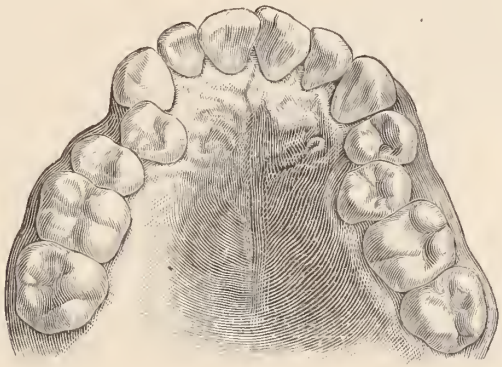
never occur upon the lower jaw, if the teeth articulate normally, because these teeth strike inside of the upper, and are thus prevented

FIG. 5.

from moving forward. A saddle, partial saddle, or semi-saddle arch may occur on the lower jaw, but these deformities are not often seen. When they do occur, they are the result of improper occlusion with

the teeth of the upper jaw. We always observe in semi-V and partial V-shaped arches that the alveolar process is contracted upon the side of the deformity. If one side of the arch is contracted more than the other, we shall see that the alveolar process is contracted in proportion to the amount of deformity ; the vault on that side is not carried up beyond the other side, which is normal. In the saddle, semi-saddle, and partially saddle-shaped arches we find the alveolar process built up about the teeth in precise conformity to the nature of the shape of the arch. If we take three thousand models of the upper jaw and arrange them in groups according to the forms here represented, and then examine very closely the arrangement of the teeth in each group, we shall be unable to find any two alike in either group ;

FIG. 6.



thus showing that an external force acting upon the jaws from the outside could not possibly be a cause. If that were possible, all the models of one variety would resemble some definite form.

Dr. Delavan says that "the prominence of the anterior region of the alveolar arch is still further increased by the projection forward of the superior maxilla at this point and of the upper teeth." This author is quite mistaken regarding the "projection forward of the superior maxilla." The maxillary bone never protrudes in front in this class of cases ; it is only the alveolar process which is carried forward by the projecting teeth. The only tissues involved in these deformities are the teeth on the one hand and the alveolar process on the other.

In most cases the cause of these deformities is an arrest of the development of the maxillary bone. This condition is due not only to hereditary influence, but also to direct causes, such as the eruptive fevers and all lesions which are constitutional and which produce long

sickness. When arrest of development of the superior maxilla takes place, we always notice a depression at the alæ nasi and a sunken condition of the bones of the face on the line drawn from ear to ear, and the abnormality occasionally extends up to the floor of the orbit. If we examine closely the faces of an audience in Chicago, we shall observe that from forty to fifty per cent. of all these people have this arrest of development of the superior maxilla. Such being the case, the arrest of development must necessarily extend to the bones of the nose, thus producing mouth-breathing. Ziem has frequently shown that if one nostril of a rabbit be permanently closed and the animal killed after it has attained its full growth, the nasal cavity of the affected side will be found to be undeveloped and asymmetry of the face will have taken place. Arrest of development of the bones of the nose, and hypertrophy of the bones and mucous membrane, are concomitants. A good illustration of hypertrophy of mucous membrane from want of use is observed by dentists when gums puff up, thicken, and extend one-half to three-fourths of the length of the teeth from lack of brushing. It would be absurd for anyone to say that mouth-

FIG. 7.

breathing is the cause of one case of V-shaped arch in every twenty, and that some other cause produced the rest of the deformities. We must have a law which will work in all varieties of contracted arches as well as the V-shaped, which variety constitutes a very small percentage of the whole. I have watched the development of these different varieties for the past fourteen years, have taken impressions of the mouths of some of the most marked cases every three months, and have compared them. I have also produced most of these different typical forms of irregularities during the movement of the teeth for the purpose of correcting deformities.

Having, then, discovered that the arrest of the development of the maxillary bones is the cause of contracted jaws and irregularities of the teeth, have we not a good foundation to work upon to discover the cause of deflected septum and of mouth-breathing?

The following tables will exhibit the differences in the heights of vaults, both in normal and defective jaws. The height is taken centrally and vertically from the gingival plane on a transverse line intersecting the gingival crests between the second bicuspids and first molars. For comparison with measurements of denuded crania, deduct .07 for the thickness of the soft tissues. Fig. 7 shows the instrument used, and the manner of making the measurements.

NORMAL JAW.

Height of Vault.	No. of Cases.	Height of Vault.	No. of Cases.	Height of Vault.	No. of Cases.	Height of Vault.	No. of Cases.
.21	1	.40	159	.56	936	.71	149
.25	2	.43	182	.59	218	.75	427
.28	70	.46	69	.62	514	.78	69
.31	171	.50	199	.65	150	.81	75
.34	169	53	429	.68	568	.84	12
.37	146						

Total number of cases, 4614. Average, .58 of an inch.

SADDLE-SHAPED ARCH.

Height of Vault.	No. of Cases.	Height of Vault.	No. of Cases.	Height of Vault.	No. of Cases.	Height of Vault.	No. of Cases.
.21		.40		.56	6	.71	5
.25		.43		.59	5	.75	5
.28		.46	3	.62	4	.78	1
.31		.50	5	.65		.81	1
.34		.53	5	.68	3	.84	
.37	1						

Total number of cases, 44. Average, .60 of an inch.

V-SHAPED ARCH.

Height of Vault.	No. of Cases.	Height of Vault.	No. of Cases.	Height of Vault.	No. of Cases.	Height of Vault.	No. of Cases.
.21		.40	1	.56	15	.71	1
.25		.43		.59	4	.75	2
.28		.46	3	.62	9	.78	
.31	2	.50	8	.65		.81	1
.34		.53	3	.68	5	.84	
.37	4						

Total number of cases, 58. Average, .55 of an inch.

SEMI-V- AND SEMI-SADDLE-SHAPED ARCH.

Height of Vault.	No. of Cases.	Height of Vault.	No. of Cases.	Height of Vault.	No. of Cases.	Height of Vault.	No. of Cases.
.21		.40		.59	1	.75	
.25	1	.43	1	.62	4	.78	1
.28		.46		.65	2	.81	
.31		.50	3	.68		.84	
.34		.53	3	.71	2		
.37	1	.56	5				

Total number of cases, 24. Average, .56 of an inch.

It seems, then, that what has been considered a change in the height of the vault in narrow and contracted jaws is only an imaginary one, the contraction conveying the impression that the vault is much higher than it really is.

The height of the vault which is normal depends upon the general shape of the cranium.

In order to strengthen further the views herein suggested, I have taken impressions of the mouths of a large number of mouth-breathers and have secured models of the same.

The following illustrations are from models of the mouths of patients over twelve years of age. They number from 1 to 24, in the order in which the impressions were taken. A sufficient number of cases are here illustrated to show the general outline of the jaws and teeth of the average mouth-breather.

In glancing over these illustrations (which are of natural size) it will be noticed that very few have contracted arches; as a rule, the vaults are less than the average in height. It will also be observed that no two cases are exactly alike, which would be the case if the contracted jaws were caused by lateral pressure of the cheeks.

I wish here to acknowledge my grateful obligations to Drs. Hawley,

Brown, and Pyncheon, specialists in diseases of the nose and throat, for their kindness in sending me their private patients.

Case 1.—Fig. 8. Hector M., age thirteen years; nationality, French; born in Chicago. Height of vault, .53 of an inch. Has always breathed through his mouth. Adenoid growth in post-nasal spaces. Collapsed condition of alæ nasi.

Upon examining this cut we observe that the teeth are late in erupting, as the patient is thirteen years of age. The bicuspids are all through upon the right side and the cuspid is just coming into place, while upon the left side the second temporary molar is yet in position, the first molar having just been removed, and the first bicuspid coming in its place. The cuspid is not so far developed as its fellow of the

FIG. 8.

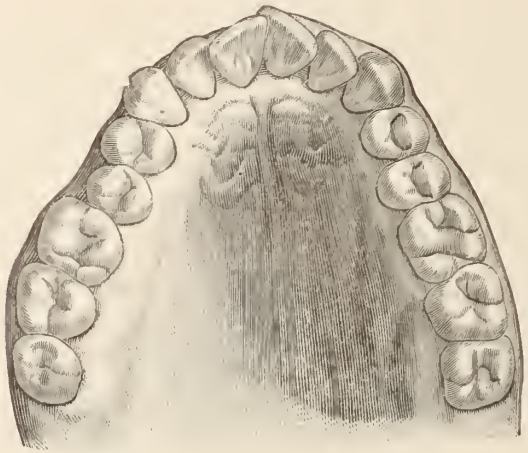
opposite side. The second permanent molars should also be in place, but they are tardy in their development. While the general contour of the jaw is normal posterior to the cuspids, there is a tendency of the incisors to contraction, with a protrusion of the mesial surface of the centrals. It will be readily noticed that the cuspids are erupting anterior to their normal position, thus crowding the incisors together.

Case 2.—Fig. 9. Paul F., age nineteen years; nationality, American. Height of vault, .75 of an inch. Commenced to breathe through the mouth at the age of nine years, at which time his nose was broken. Arrest of development of the bones of the nose. Adenoid growth. Hearing and eyesight are poor.

The jaw of this case is well developed, with a normal palate but higher than the average, being three-fourths of an inch in height.

All the teeth have erupted. The anterior teeth have a tendency to contraction, due to the fact that all the teeth tend to push forward; the central incisors do not protrude as in No. 1, because the lateral incisors overlap them. The right side of the arch tends to assume

FIG. 9.



the saddle-shaped deformity, due to the position of the bicuspids, caused by too long retention of the temporary teeth. It will be observed that the two sides are markedly asymmetrical. This cut

FIG. 10.

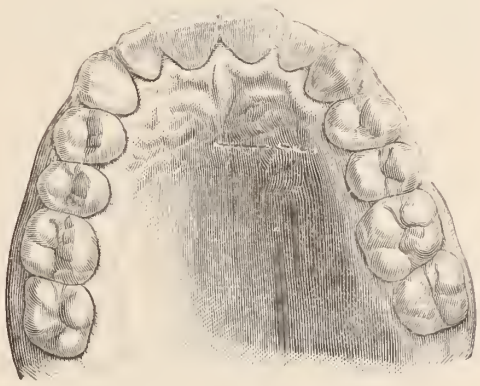
nicely illustrates the point previously mentioned, that if contraction of the jaw were due to contraction of muscles in mouth-breathing, both sides would be alike.

Case 3.—Fig. 10. Miss Florence T., age thirteen years; nation-

ality, American. Height of vault, .46 of an inch. Had scarlet fever at five years of age. Commenced to breathe through mouth at the age of eight. Arrest of development of the bones of the face and nose.

This is a well-marked illustration of defective development of the superior maxilla, and also of arrest of development of the bones of the face and nose. As in No. 1, the second molars have not yet made their appearance. The central incisors overlap, but do not protrude. The right side of the arch tends to assume the saddle-shape deformity, due to the position of the bicuspids. The cuspid has not fully erupted on this side, and is still more tardy in its appearance on the left. As is true of No. 2, the two sides are asymmetrical, and the height of the vault is quite a little less than the average. When the second and third molars appear, an unusual protrusion of the anterior

FIG. 11.



teeth must necessarily result in order to give sufficient room for the molars. If this is allowed to progress without mechanical interference, a marked V-shaped deformity will result.

Case 4.—Fig. 11. Dr. H. S., age twenty years; nationality, American. Height of vault, .68 of an inch. He has been a mouth-breather all his life. Has deflection of the septum nasi, and at the age of fourteen was operated upon without any benefit. The bones of the nose are well developed, but those of the face are slightly arrested.

While the jaw is not quite as large as the normal jaw, the teeth are very regular, finely developed, and without a cavity. It would be rare to find a more nearly perfect arch. The articulation with the inferior maxilla is at all points exact, and we have here a marked illustration of an orthognathous jaw.

Case 5.—Fig. 12. Mr. William M., age fifty-two years; nation-

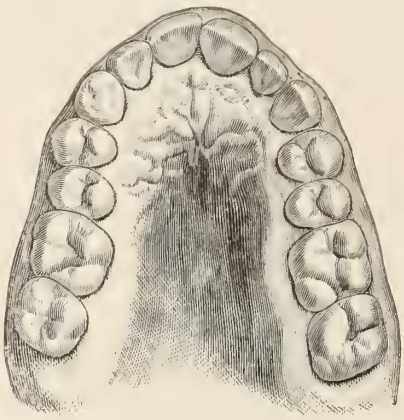
ality, American. Height of vault, .43 of an inch. Always breathed through the mouth. Bones of the nose and face well developed. Last year had hypertrophied bone removed from the nose. Eyesight

FIG. 12.

and hearing are good. The jaw is well developed, and shows no deformity.

Case 6.—Fig. 13. Miss H. C., age seventeen years; nationality, American. Height of vault, .65 of an inch. Has not always breathed

FIG. 13.



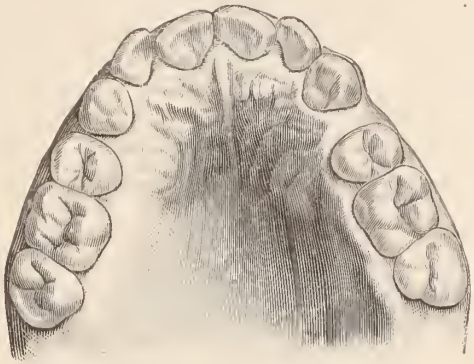
through the mouth. Has adenoid growths. Has had measles and chicken-pox.

This jaw is considerably contracted throughout, but it is more noticeable through its lateral diameter. The alveolar process is

hypertrophied on either side, the hypertrophy being more marked on the right side.

Case 7.—Fig. 14. Kate K., age seventeen years; nationality, American. Height of vault, .65 of an inch. Has always breathed

FIG. 14.



through the mouth. Has post-nasal catarrh. Has had measles and whooping-cough. This jaw was arrested in its development, and the first bicuspids have been extracted to make room for the other teeth.

The lateral incisors overlap the centrals, due to a lack of room

FIG. 15.

before the extraction of the bicuspids. The two sides are asymmetrical, the left side diverging to allow the eruption of the second molar.

Case 8.—Fig. 15. Mr. H., age eighteen years; nationality, American. Height of vault, .59 of an inch. Has always breathed through

the mouth. Had scarlet fever at the age of eighteen months. Received a blow upon the nose which caused a deflection of the septum nasi to the left. The left nostril is entirely closed by hypertrophy of bone and mucous membrane. There is slight hypertrophy of the mucous membrane of the right nostril, also hypertrophy of the mucous membrane in the post-nasal space. Arrest of development of the bones of the nose. No. 8 is an illustration of marked arrest of development of the entire jaw. The anterior teeth are much crowded, and on the left side the lateral incisor has erupted within the arch ; that of the right side partially within the arch. The cuspids have erupted outside of the arch ; on the right side the sixth-year molar has been extracted, in consequence of which the second molar has pushed forward.

FIG. 16.

In this case the small jaw is inherited from the mother (whose jaw was unusually small), and is in harmony with the bones of the face. The teeth, which are exceedingly large and have long roots, are inherited from the father, and are so out of proportion to the small jaw that the posterior teeth have moved forward and filled the spaces intended for the cuspids.

Case 9.—Fig. 16. Geo. H., medical student, age twenty-five years ; nationality, American. Height of vault, .71 of an inch. Commenced to breathe through the mouth at the age of ten. Marked arrest of development of the bones of the face and nose. The nasal cavities are small, and the nasal septum is deflected slightly to the right. Hypertrophy of cartilage on the left side ; the mucous membrane is slightly thickened. The posterior nasal cavities are clean.

The patient has had measles, chicken-pox, mumps, and two attacks of pneumonia. Had severe rheumatism at the age of twenty-one, and at the present time there is tuberculosis of the left ankle.

An examination of the jaws revealed the following facts: the lower jaw is excessively large; although all of the teeth of the lower jaw tip inward, yet the outer cusps of the upper teeth just touch the inner cusps of the lower teeth. There is marked arrest of development of the upper jaw, and on the right side the arch has a tendency to assume the saddle-shaped deformity. On this side the cuspid has erupted externally to the arch and between the central and the lateral incisors; its mesial surface is directed inward. The lateral incisor is internal

FIG. 17.

to the other teeth. The lateral incisor on the left side is situated internally to the central incisor and cuspid, and has caused a slight rotation of the central incisor. The second molars are small, and have erupted externally to the first molar on account of lack of room in the jaw. The alveolar process and mucous membrane are hypertrophied.

This case clearly shows that at the time of the formation of the irregularities of the teeth the alveolar process and mucous membrane began to hypertrophy; coincident with these was arrest of development of the bones of the face, nose, and jaw, and the habit of mouth-breathing was formed.

Case 10.—Fig. 17. Mr. William S., age thirty-four years; nationality, German. Height of vault, .71 of an inch. Has always breathed through the mouth until an operation four years ago. Has had scar-

let fever and measles. As will be observed by examining the cut, this jaw is well developed. The central incisors overlap slightly, due to Riggs's disease. The left side has a tendency to assume the saddle-shaped deformity, due to the position of the bicuspids, which was probably assumed on account of the too long retention of the temporary teeth. The crowns of the molars have decayed and broken off. The thickening of the mucous membrane is the result of Riggs's disease.

Case 11.—Fig. 18. M. W., age thirteen years ; nationality, American. Height of vault, .62 of an inch. Has breathed through the mouth for the past six years. There is arrest of development of the bones of the face and nose. The patient has considerable catarrh. Is now under treatment for irregularities of the teeth.

FIG. 18.

The jaw is much contracted, especially in the anterior part. On the right side the lateral incisor is deformed, and is represented by a conical tooth situated internally to the other teeth. Posterior to this is the temporary cuspid ; on account of the retention of this tooth the permanent cuspid is erupting externally to the other teeth and between the temporary cuspid and permanent central incisor. On the left side the lateral incisor is deformed in a similar manner to that on the right, but its position is normal. The temporary cuspid on the left side remains. Owing to the fact that there was insufficient room in the jaw for the second molars, the teeth anterior to these moved forward, producing the V-shaped projection of the central incisors.

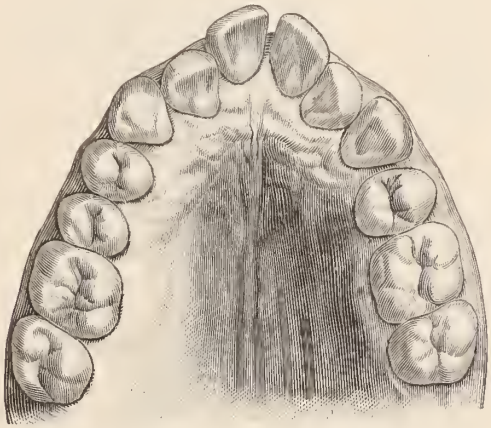
Case 12.—Fig. 19. Charles D., age fifteen years ; nationality, American. Height of vault, .53 of an inch. Deflection of septum nasi

and thickening of mucous membrane. The patient has always breathed through the mouth.

This case is similar to case No. 8, in that the small jaw is inherited from the mother and the large teeth from the father.

The dental arch is contracted anterior to the cuspids, and the anterior teeth are crowded; posterior to the cuspids the dental arch is normal. The first bicuspid on the left side has been removed to afford more room for the other teeth; the corresponding tooth on the right side should also have been removed. The fact that it was allowed to remain caused a crowded condition on that side, and the incisor has passed beyond the median line of the jaw, encroaching upon the other side. Owing to there being insufficient room in the

FIG. 19.



jaw for the second molars, the teeth anterior to these have pushed forward, producing the V-shaped protrusion of the central incisors.

Case 13.—Fig. 20. Mr. H. B., age twenty years; nationality, ——. Height of vault, .71 of an inch. Has always breathed through the mouth. The alveolar process is well developed, but the maxillary bones are arrested in their development. The left nostril is entirely closed. There is hypertrophy of the mucous membrane of the right nostril.

Has had scarlet fever and whooping-cough. Although there is arrested development of the maxillary bones in this case, no deformity is produced, owing to the fact that the teeth have crowded the alveolar process upon the outer surface of the bone, thus forming a large arch. The only irregularity of the teeth is on the right side, where the

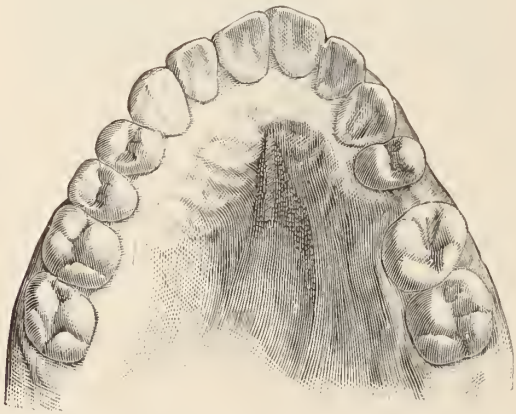
lateral incisor by erupting slightly within the arch has pushed the distal surface of the central incisor slightly outward.

Case 14.—Fig. 21. Mr. M. C., age thirty-nine years; nationality,

FIG. 20.

Canadian. Height of vault, .71 of an inch. Had always breathed through the mouth until he came to Chicago in 1884, since which time he has gradually improved, and can now breathe partially well. He has always suffered from catarrh, and now, when a cold is taken,

FIG. 21.



the mucous membrane of the nose becomes inflamed and mouth-breathing is the result. This case illustrates a marked arrest of development of the jaw; on account of the small size of the jaw, the

teeth anterior to the molars pushed forward and became crowded when the molars erupted. Upon the left side the second bicuspid has been removed, thus affording sufficient room for the eruption of the second molar on that side.

Case 15.—Fig. 22. Miss C., age eight years ; nationality, Canadian. Height of vault, .43 of an inch. Has always been a mouth-breather. Has suffered from catarrh for the past five years. Her general health has improved since her removal to Chicago, six months ago.

This cut shows a marked arrest of development of the superior maxilla.

This case is illustrated at this age, eight years, as being of unusual interest in connection with the theories advanced in this paper. The

FIG. 22.

unusually low elevation of the vault is due to lack of development ; no doubt the normal height will be reached at the proper age. I extracted the temporary molars and cuspids upon the left side, and the temporary second molar upon the right side, just before securing the model. Although the permanent bicuspids and cuspids upon the left side are not visible, yet the appearance of the alveolar process leads me to believe that their position will be normal. Upon the right side all the teeth belong to the permanent set excepting the cuspid. The cause and manner of the production of the saddle-shaped arch upon this side of the jaw is nicely illustrated in the position assumed by the second bicuspid and first permanent molar. Upon removing the temporary molar, the crown of the bicuspid was observed to be situated exactly in the position represented in the illustration. The first permanent molar, having moved forward, has crowded the cuspid into the roof of the mouth. The V-shaped appearance of the incisors is due to lack of room in the jaw for their normal eruption.

Case 16.—Fig. 23. Miss J., age thirteen years; nationality, Hebrew, born in America. Height of vault, .59 of an inch. Adenoid growth in post-nasal space. She is unable to breathe through the nose.

This is a case of unusual interest; the arrest of development is very

FIG. 23.

marked, and the maxilla is unusually small. The lateral incisors have never erupted, and the cuspids have moved forward and taken their places. The jaw is very narrow across at the bicuspids, and much contracted anterior to them. The jaw is of a marked V shape.

FIG. 24.

Case 17.—Fig. 24. Master L., age thirteen years; nationality American. Height of vault, .62 of an inch. He has breathed through the mouth for the past six years. There is considerable arrest of development of the bones of the nose. The left nostril has collapsed

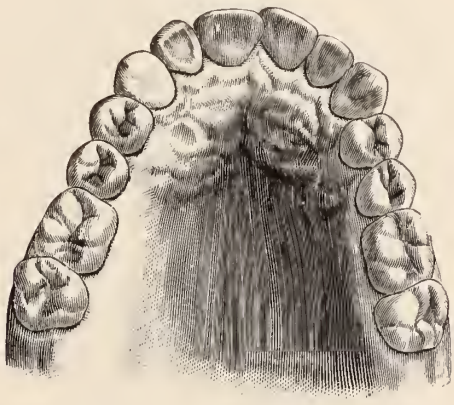
and the right nostril partially, so that the patient can breathe through that side only, and with difficulty.

As will be observed, the jaw in this case is well developed. The forward movement of the incisors is due entirely to a local cause, that of irritation, produced by the lower teeth striking against the roof of the mouth, which caused a deposit of bone-cells at that point.

Case 18.—Fig. 25. Geo. W., age fourteen years. Nationality, American. Height of vault, .59 of an inch. Has always breathed through the mouth. The septum nasi is deflected; there is hypertrophy of the mucous membrane, and the left nostril is closed.

In this case the jaw is well developed, and although the teeth are

FIG. 25.



large there is no marked deformity. The central incisors overlap slightly; the anterior teeth protrude on account of the pushing forward of the posterior teeth. A side view shows this forward inclination of all the teeth.

Case 19.—Fig. 26. W. T. O., age twenty-five years; nationality, American. Height of vault, .62 of an inch. He has been a mouth-breather for twelve years. The left nostril is entirely closed, the result of a blow received at the age of thirteen.

In this case the jaw is well developed. The slight saddle-shaped appearance of the right side is due to the position of the second bicuspid and first molar. The second molar has crowded the first molar forward and inward. On the left side the first molar has been removed and the second molar has moved forward, partially filling the space.

Case 20.—Fig. 27. M. H., age sixteen years; nationality, Amer-

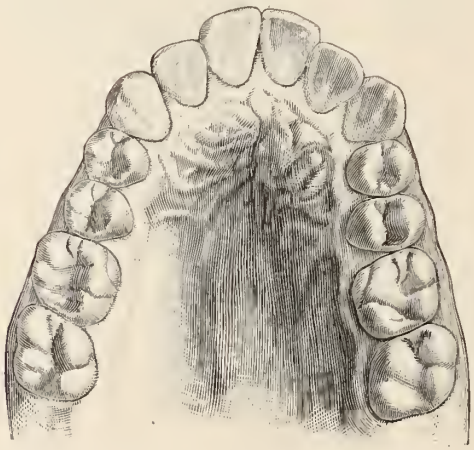
ican. Height of vault, .59 of an inch. Has always been a mouth-breather. There is present a complete collapse of the nostrils.

This case represents a small jaw anterior to the cuspids. There

FIG. 26.

is a slight protrusion of the anterior teeth and alveolar process. On the left side the lateral incisor has erupted slightly inward relatively to

FIG. 27.



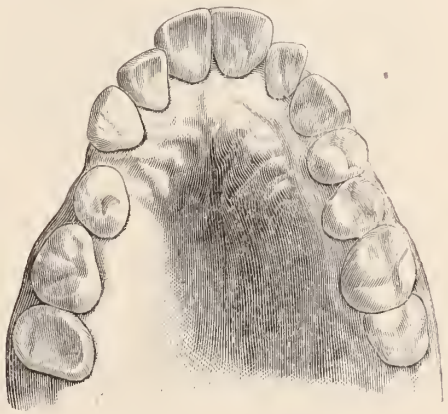
the central incisor and cuspid. The two sides are markedly asymmetrical ; the left side is quite undeveloped.

Case 21.—Fig. 28. Miss H. T., age —— ; nationality, ——.

Height of vault, .62 of an inch. Has always been a mouth-breather because of the thickening of the mucous membrane of the nose.

In this case the development of the maxilla has been arrested. There is considerable protrusion of the anterior teeth and alveolar process, due to lack of room ; associated with this is Riggs's disease. The jaw is narrow and compressed in the region of the bicuspids. On the right side the first bicuspid has been removed to afford room for the other teeth. The left lateral incisor is small and the left bicuspids are situated within the arch, erupting in this position because of the retention of the temporary teeth. This side approximates the saddle-shaped deformity.

FIG. 28.



Case 22.—Fig. 29. J. G., age sixteen years ; nationality, American. Height of vault, .50 of an inch. He has been a mouth-breather for ten years. The anterior part of the jaw is contracted, approximating the V-shaped deformity. There is no irregularity of the teeth.

Case 23.—Fig. 30. Mr. G. C. A., age twenty-six years ; nationality, American. Height of vault, .75 of an inch. Has always breathed through the mouth.

This case illustrates the lack of harmony between the size of the jaw and the teeth, in consequence of which the anterior teeth have erupted irregularly. The central incisors overlap slightly ; the approximal surfaces of the lateral incisors are internal to the palatine surfaces of the centrals. Posterior to the cuspids the dental arch is normal.

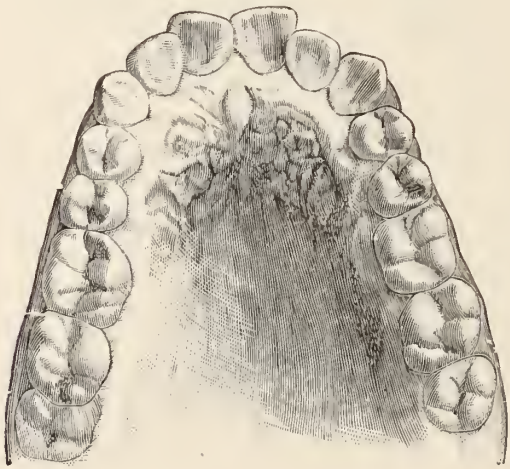
Case 24.—Fig. 31. Miss E. B., age twelve years ; nationality, American. Height of vault, .53 of an inch. Has always breathed through the mouth. Septum nasi is deflected, and the left nostril

is closed. The anterior part of the jaw is contracted, and in consequence of this contraction the central incisors protrude. The lateral

FIG. 29.

incisors are slightly internal to the centrals, lack of room in the jaw preventing them from assuming their normal position. It will be noticed that the cuspids are erupting. On the left side the second temporary molar is seen.

FIG. 30



With this presentation of a very considerable number of recorded observations accompanied by many representative illustrations, the

writer respectfully submits that his conclusions must be deemed to be fairly founded on facts, a refutation of which will require the citation

FIG. 31.

of a like series of actual observations on the part of any objector to the views herein set forth.

DISCUSSION.

DR. GEORGE J. FRIEDRICHS: I was not here when the paper was read until toward the close, but I think its object is to prove by these measurements of the mouth that mouth-breathing has a tendency to change the jaw.

DR. TALBOT: I did not try to make any point. I made these measurements to see if there was any difference between contracted arches and high vaults of mouth-breathers, and I have shown by the examination that the vaults are lower on an average in contracted arches than in normal arches.

DR. FRIEDRICHS: Has the normal arch been established?

DR. TALBOT: I should think that 4614 cases ought to establish it.

DR. FRIEDRICHS: To define what constitutes health is a very difficult matter. Health is only comparative, because, where one man is considered healthy, in comparison with another he may be a sick man, and it is the same in regard to the measurement of the roof of the mouth.

DR. ABBOTT: I want to congratulate Dr. Talbot upon what seems to be a very successful outcome of his work in this direction. It seems very evident that he has established a fact, that mouth-breath-

ing does not produce the V-shape or saddle-arch. This is to me an interesting and a valuable piece of information, although I am not particularly interested in that line of study. I am very much gratified indeed at this paper, and at the results of Dr. Talbot's investigations.

Dr. Fillebrown : I wish to add an expression of my appreciation of the excellence of the paper, and I have one suggestion to make in corroboration of Dr. Talbot's position. I think if any person present will drop his under jaw down so that the mouth shall be as wide open as that of any mouth-breather, and pass his tongue up by the side of the upper teeth, he will find room enough for it to pass between the buccinator muscle and the teeth, showing plainly that the muscle does not press upon the teeth, even at rest, with the mouth open.

Dr. Horton : I rise to congratulate the author and to thank him for the pains he has bestowed upon this subject in his paper. I read the article he referred to, and I have read with not a little astonishment the teachings of the professors who have taught the doctrine which this paper has so conclusively refuted. I was a little surprised that the author should assert that mouth-breathing was confined to the enlightened and the civilized, and the reason why it should be so is more than I can at this moment comprehend.

Dr. Watkins : I understood from the paper that the contraction of the arch was not caused by mouth-breathing after the teeth had erupted. I would like to ask the doctor if he has found that mouth-breathing was the cause of any contraction of the arch before the permanent teeth were erupted, or during their eruption. That, it seems to me, is very important.

Dr. Talbot : Being a graduate of medicine, I have had the opportunity of examining into the cause of the early cases of thumb-sucking and mouth-breathing, and I have sometimes found babes breathing through their mouths entirely within two or three weeks after birth, and yet I do not think that there ever was a case of contracted arch with the first set of teeth. I never have seen one ; and we do not see contracted arches until between the eighth and the twelfth year, and the contraction ceases after the teeth are erupted. It all takes place at the time the permanent teeth are erupting.

Dr. Peirce : In common with the gentlemen who have spoken, I wish to congratulate the doctor upon the labor bestowed upon this paper and its results, but still I must dissent somewhat from his conclusions. I think he has misstated the case when he says that mouth-breathing has been considered the main cause of contracted arches. It has been considered one of the factors, and the statement he has

made here this evening certainly is an argument in favor of that claim. The fact that deciduous teeth are not contracted by mouth-breathing is simply due to the fact that the shape of the mouth is established in fœtal life, and the teeth that are being erupted are short, and there is little mechanical force brought to bear upon them, so that they cannot be forced out of position or the arch contracted during their short period of development. But he stated also that the period when the mouth changed or became contracted was from the eighth to the twelfth year. That is the period when the bicuspid teeth are gradually coming into position, and the pressure brought upon those teeth by the cheeks or soft tissue does have a tendency, while they are being developed slowly, to force the crowns a little into the mouth, and hence produce a narrower arch by virtue of that. The fact that the change never takes place after the age of twelve shows that the development has been going on while these teeth are being developed, and only then. So that I simply claim that this mouth-breathing, or the fact that the mouth is kept open while the child is at rest, is one of the factors in narrowing the arch. He says if this were the case the sides would be influenced alike. Not at all necessarily, because the pressure may be greater on one side than on the other; at night the child may lie habitually upon one side. There is always a difference in the forces acting upon these teeth, so that the result is not necessarily the same on both sides, and therefore it seems to me it is not an evidence that there is not some influence of that kind at work; but the evidence that has been claimed in favor of it is what he has stated, that from the ages of eight to twelve is the period that the change takes place, and only then, and that is the period when these bicuspid teeth are being slowly developed.

Dr. Morgan: The paper states that these departures from the normal shape are confined mostly to the cultivated races. I wish to emphasize that fact by stating that they are very much more rare among the negroes in the South than in the whites of that region, and that it is a comparatively rare occurrence to find a negro with a high or deformed arch, or with irregularities in the teeth. I may not have understood it all, as my hearing is a little dull, but I understood him to say that the office of the alveolar processes was to some extent to protect and cover the germs of the teeth. As I understand it, the alveolar processes never make their appearance, especially with the permanent teeth, until the crowns are free from the bony structure; in other words, that the alveolar processes are not developed except as the root of the tooth is developed.

Dr. Truman : I would like to ask Professor Peirce, if the bicuspids at twelve years of age are liable to be forced in the mouth by the action of the buccinator muscle, why is it that the deciduous teeth are not similarly affected? No change is ever noticed in the deciduous molars. Should they be moved, the tendency would be to drag over the permanent bicuspids as they are ordinarily developed between the deciduous molar roots. I take the same position as stated by Dr. Fillebrown, that it is impossible for the muscles to act upon these teeth to contract the arch, and I am gratified to-night more than words can express that this to me very absurd theory, that mouth-breathing produces these irregularities, has, I am sure, been settled for all time.

Dr. Peirce : I will simply state that the deciduous molars are very short, and they are very quickly erupted compared with the length of time that the bicuspids are occupying their permanent places, and therefore there is not nearly the mechanical influence brought to bear upon the deciduous molars that there is upon the permanent bicuspids. If the argument presented by the doctor in his paper this evening is correct, then we would suppose that an aneurism of the cheek would have no influence, and yet I am certain many gentlemen have seen a slight aneurism on the cheek that has forced the bicuspids and the cuspids entirely onto the palatine surface. I have had two cases of that,—one very marked one,—where the aneurism of the cheek was as slight and soft as possible for the tissue to be, and yet its presence displaced those three teeth.

Dr. Abbott : In reference to the development of alveolar process. One speaker has said that it does not develop until the roots of the teeth commence to grow. That is not the fact. The development of the alveolar process begins at the time of the beginning of the development of the crown, and when the crown of a permanent tooth is fully developed, the alveolar process about it has grown considerably over and above that which has held the temporary tooth in its place.

Dr. Patrick : Averages are not scientific facts. They are tentative amusements of statisticians. If you measure one thousand human superior maxillaries, add the measurements together, and divide their sum by one thousand, you will have the average of that many superior maxillaries. If, however, you add another, that measures either a little more or a little less than that average, that average becomes canceled and a new average is formed. I object to the manner in which these measurements for averages have been made, irrespective of race. Averages answer a purpose, in some cases, for speculation. For instance, a life insurance company can deal with the average age

of man, but an immense margin is left in taking the risk. It is not scientific, it is speculative. It is gambling on the probable longevity of man. That is not all. While an average is not a scientific fact, it is worse. It destroys individuality. It puts aside and renders classification impossible. Men have tried averages for the last one hundred and fifty years in scientific matters, and have always abandoned them. I shall not occupy your time with reciting prominent instances of it, but I will give you one. Dr. Samuel George Morton, a most energetic, well-qualified, thoroughly-educated Philadelphia gentleman, made a splendid collection of crania. His measurements are now all thrown aside which he spent his whole life and energy in establishing. So much, then, for averages obtained by measurements. Now, measurements sometimes are very useful. Where they tend to mark the boundaries of individuality they are valuable, because they assist in classification. It has been made useful in a marked degree by the celebrated Bertillon, who introduced a system of measurements of portions of the human body for purposes of identification or reidentification of criminals. The system of measurements in this instance rests on the fact that there are no two human beings on the face of the earth that are exactly alike ; and that is the reason why it *is* valuable, so that an individual once measured can always be identified ; and it is applicable in no other sense. This system is advocated for taking the measurements of enlisted men in the army and navy in order to recover deserters. But what would you think of Bertillon if he measured the fingers of so many men and then took the average? He would destroy the very usefulness of his measurements, would he not?

Dr. Talbot : I will not attempt to answer Dr. Patrick at this time. I may do so when he reads his paper. I have only one word to say in regard to the remarks made by my friend Dr. Peirce, and that is, that in contracted arches we find the greatest contraction at the second bicuspid. If the buccinator muscle influenced the contraction, the first molar must be involved, because the buccinator muscle extends clear to and involves the wisdom-tooth, but we rarely find the first permanent molar involved in the contracted arch. It would be impossible for the buccinator to produce that, because the muscle could not contract one or two fibers sufficient to produce that form. Again, if mouth-breathing were the cause, the first teeth would necessarily be involved, because the very point that Dr. Peirce makes shows that the arch being smaller, and the alveolar process in its constructive stage, the temporary teeth would be involved if the buccinator muscle had anything to do with it.

SECTION VI.—Continued.

Examination and Tabulation of Pre-historic Crania.

REPORT BY J. J. R. PATRICK, CURATOR.

GENTLEMEN: I have the honor to present herewith the first annual report of progress made in the examination of human crania contained in museums and private collections in the United States.

As the annual reports of the Curator are intended to present a history of the investigation, it seems proper to state that to facilitate the work much time has been expended since our last meeting in the preparation of instructions, diagrams, and tables for forming the records. Provision has been made for recording the physiological and pathological condition of ten thousand human crania.

The selection of qualified persons to take charge of the examinations and record the condition of the crania in the books provided for that purpose has also consumed a great deal of time. As a matter of economy, as well as courtesy to the profession in selecting the persons to superintend the work, I have been guided by their vicinage to the different museums, as well as their qualifications; and the result has been eminently satisfactory.

The work of examining and tabulating the human crania in the Peabody Museum of Harvard University was intrusted to Dr. R. R. Andrews, of Cambridge, Mass., on the 18th of March, 1891. Dr. Andrews found it expedient and necessary, with my concurrence, to employ Mr. G. W. Newton, an anatomist and physiologist, to devote his whole time for two months to the examination; Dr. Andrews and Dr. Knight inspecting the work during its progress. The work has been carefully and faithfully performed by Mr. Newton, and is vouched for by Drs. Andrews and Knight. The work thus far completed in the Peabody Museum embraces human crania from the following localities:

Peru, Terra del Fuego, Cachuila, Mexico, Massachusetts Indians, Stonegrave Indians of the Cumberland Valley, California Indians, Nicaraguan, Guatemalan, and Zacahian ; making a total of one thousand eight hundred and eighty-one crania.

The work of examining and tabulating the human crania in the Academy of Natural Sciences of Philadelphia, Pa., was intrusted to Dr. C. N. Peirce, who, with the assistance of Dr. J. E. Ives, has carefully examined and tabulated one thousand and six human crania, which completes the work on the collection of crania in the Academy of Natural Sciences of Philadelphia.

The work of examining and tabulating the human crania in the Patrick Anthropological Collection, now in the rooms of the Historical Society of Missouri, located in the city of St. Louis, Mo., was performed by Dr. H. J. McKellops, Dr. A. H. Fuller, and Dr. J. W. Wick, all of St. Louis. The crania in this private collection were taken from burial mounds near the great Cahokia Temple Mound, situated in St. Clair and Madison Counties, Ill., on the American Bottom. The number examined and recorded is sixty-nine.

The work of tabulating and recording the human crania in the collection of the Army Medical Museum, Washington, D. C., was intrusted to Dr. H. B. Noble, of Washington, who has recorded the condition of some two hundred crania.

A small collection of forty human crania has been examined and tabulated by Dr. Louis Ottofy and Dr. L. L. Davis, of Chicago.

The records of the finished work now in my possession give a total of two thousand one hundred and ninety-six human crania examined and tabulated, but they were returned too late to make a detailed report of the condition of the teeth and jaws.

SECTION VI.—Continued.

Physiological Action of Obtundents.

Paper by L. E. CUSTER, of the Section.

THIS paper has been written with a view to making clear and harmonizing a few conflicting ideas regarding the action of obtundents of the sensitiveness of the dentinal fibril.

Owing to conflicting theories, it will be fair to assume that this tissue whose sensibility we desire to obtund is of the nature of simple protoplasm, with, in this instance, an exalted sensitive function. It contains albumen, and this is therefore coagulable ; it is made up largely of water, and may be desiccated ; it is incased in a tube, and when it does not entirely fill this tube a fluid fills the remaining space. This fluid may be removed, and the temperature of the fibril may be reduced. These are the conditions upon which we are to work.

The dentinal fibril does not possess a blood circulation, and on that account the nutritive movements are slow ; so slow that any agent which produces local anesthesia in other parts in a few minutes will be very slow in acting to any depth in the dentinal fibril ; so slow, indeed, that we need hardly look in this direction for a practical agent. Cocaine as a typical representative of this class of agents has not been effective for this reason. Any agent which is to act upon the sensitive function of the dentinal fibril must be more powerful than cocaine ; it must not coagulate albumen ; it must have an affinity for water ; it must possess a penetrating property, and insinuate itself into the tubule, for it will not be carried in by circulation and but very slowly by any nutritive movement. Until we find an agent possessing these qualities, we need not expect to obtund sensitive dentine by suspending the fibril's irritability.

The most satisfactory results have been obtained in other directions. The dentinal fibril has a definite composition. The elements of all the

proteids are in a definite proportion, and we have reason to believe that the proportion is very delicately balanced. If the structure of the fibril be changed, its irritability ceases and it can no longer communicate sensation.

The change of structure most easily accomplished is the coagulation of its albumen and the withdrawal of its water. If the albumen is coagulated, it is as effectual in checking neural movement as though the albuminous ingredient had been withdrawn ; indeed, the coagulation of albumen itself renders it harder, and its presence would prevent any exhibition of life more readily than if it were removed.

The coagulation of albumen, unless produced by heat, is somewhat self-limiting, so that since heat of 160° F. is not allowable for sensitive dentine, the action of present known coagulants is not entirely satisfactory. Before coagulation can be a practical success, we must have an agent which penetrates to some depth.

Penetrating escharotics, such as arsenic and the like, since they burn the tissue beyond recovery and endanger the pulp, should not be considered.

The other method of changing the structure of the dentinal fibril is by the removal of the water. The water holds a twofold relation with the fibril,—that which is a constituent of the fibril itself, and that which fills any inequalities between the fibril and Neumann's sheath. One is a constituent, and the other a condition. The water which is a constituent is always present ; it is always found where life and motion occur ; it is always a necessary condition for neural activity ; it makes up three-fourths of the entire body and about ninety per cent. of the dentinal fibril. Constituting such a large proportion of the fibril, it is evident that there would be a proportionate change in the structure and physical character if the water were removed. The size would be decreased, the albumen if coagulated would become harder, and in this desiccated condition it would be practically dead, incapable of performing nutrition and function.

The water which fills any inequalities between the fibril and its investments may be accessory in the transmission of sensation. In this relation it may transmit vibrations to the fibril or even to the fibriloblast. One of the most delicate nerves of special sense, the auditory, receives its impressions through the endolymph in which its terminals float. So if the water surrounding the fibril should be removed, the fibril's transmitting power may be affected.

The watery contents of the tubule are withdrawn by evaporation and by bringing an agent in contact with it for which it has an affinity.

Evaporation is produced by raising the temperature and subjecting to a current of air. This is practically accomplished by the repeated blasts from a hot-air syringe. The water surrounding the fibril is comparatively easily abstracted, but to loosen the molecular grip in the fibril itself requires more force. There are many agents which have an affinity for water, but not all are suitable for use in the cavity of a tooth. The agents most desirable for this purpose would be alcohol or glycerin. Alcohol possesses a property different from glycerin which makes it valuable: it is volatile. Water is taken up by the alcohol and evaporates with it. Of course the affinity is increased the nearer the alcohol is absolute.

The water is more thoroughly withdrawn when the two principles, affinity and evaporation, are employed together.

As compared with coagulation as a means of changing the structure, dehydration is more thoroughly accomplished with the present known methods, and hence the results are more satisfactory; so much so that I suppose the majority of operators use dehydration almost entirely as a means of obtunding sensitive dentine.

If we use a combination of the two methods of change of structure,—desiccation followed by coagulation,—we will secure more profound results. As a proof of the truth of this statement, we have an agent which when used on sensitive dentine both withdraws the water and coagulates the albumen, and a more effective single medicament for sensitive dentine we have not. This stands alone and at the head of the list as a practical, efficient, and I may say safe agent as an obtundent. I refer to chloride of zinc,—not a fluid when its affinity for water has been satisfied, but a crystal which will deliquesce when placed in the cavity.

The last method by which the fibril's transmitting power may be lessened is by changing the temperature. This is of value as an obtundent of sensitive dentine on the same principle that it acts upon the soft tissues. As a condition for the perfect performance of nerve-function, there must be maintained a certain temperature which is normal to the organism. If that temperature is lowered, neural activity is lessened somewhat proportionate to the departure from normality, so that there may be a point reached where complete anesthesia is produced. Of all the obtundents of sensitive dentine, extreme cold is the most effective; not that it is any better than perfect coagulation or dehydration, but because the temperature of dentine may be reduced more thoroughly than the albumen may be coagulated or the water withdrawn in ordinary practice. This is because

of the distance of the bulbous portion of the pulp from collateral circulation, there being no blood-circulation in the dentine, the ease with which the crown of the tooth may be isolated from surrounding sources of warmth, and also because we have refrigerating agents so simple and effective in their action that they may be made to act even beyond the necessities of the case.

The reduction of temperature is best accomplished by the use of volatile agents, such as sulphuric ether, chloride of methyl, rhigolene, or nitrous oxide.

It has been claimed for ether and nitrous oxide when used upon dentine that they act by abstracting the moisture. If we substitute the word *heat* for *moisture*, their action will be correctly stated. It is a mistake to attribute the action of the above agents to any water which they may withdraw, for these are cold-producing agents, and it is contrary to the laws of physics to produce evaporation by lowering the temperature; so that water cannot be withdrawn by these agents unless there is an affinity, which with ether there is none, and with nitrous oxide the temperature is lowered so rapidly that the water is frozen before any quantity could be removed by affinity. Any agent which reduces the temperature opposes evaporation or any chemical action upon the tubular contents. All such agents obtund sensitiveness in but one way, and that is by reducing the temperature.

It will be observed from the foregoing that the function of the fibril may be completely suspended by coagulating all its albumen, by withdrawing all its water, or by lowering its temperature to a certain point. But the entire coagulation of its albumen is practically impossible at present, the entire removal of its moisture almost impossible, and the reduction of temperature is the only one which acts to any desired depth. So theoretically, and it has been found practically, that, except arsenical preparations, refrigerating agents are the most effective obtundents of sensitive dentine allowable.

Recently there have been introduced three new methods having the same principle of action which are misleading. The thermal obtunder of Small, the Milton obtunder, and the Richmond obtunder are instruments and methods which use an elevation of temperature and the vapor of an alcohol or an essential oil, or a combination of these, upon the dentine. There is a silent claim in all these that there is a specific action of the vaporized agent upon the conductivity of the fibril, otherwise why use anything but the jet of hot air itself?

The effect of throwing a warm or hot blast upon a tooth is to heat it. By heating the dentine evaporation of its moisture takes place.

The fibril dries up, and there is an outward movement as the water vaporizes and escapes from the tubule. No medicine can possibly enter the tubule during this time unless it has an affinity for water. When an oil or any agent which has no affinity for water is used in these methods, it will be apparent how utterly useless it is. Then the oil is not applied in its liquid state, but in a vapor. Is the vapor of the oil of cassia more powerful than the liquid form in preventing the development of micro-organisms? What virtue can possibly be attached to attenuation, that the liquid must be vaporized? Power lies in concentration. What effect can a vapor have upon the dentinal fibril if it simply fills the cavity of the tooth? In order to be effective it must condense and enter the tubule before it can come in contact with the fibril, and this cannot take place when it is applied with heat.

The application of a vaporized agent in a warm or hot blast is essentially one of *desiccation*. The heat is the only virtue in this unless the agent has an affinity for water, when it may aid in carrying off the water vapor. The vapor of alcohol is effective on this account, and I think those who have recommended the use of oils or any agent which has no affinity for water are laboring under a delusion.

Unfortunately, the agents which are most effective are most dangerous to the pulp, and in our selection of an agent for the case at hand this is to be borne in mind.

SECTION VI.—Continued.

The Dentition of the Felidæ.

By ALTON H. THOMPSON, of the Section.

THE dentition of the true cats presents an interesting subject for study, on account of being a conspicuous example of a highly specialized dental organization. The extremes of form among the teeth of animals indicate the great possibilities of variation, and thereby throw light on less highly specialized forms, in which extremes are modified and compromise forms, or composites, are developed, which are adapted to more or less mixed diets. Special and extreme forms of diet, of course, lead to the evolution of special and extreme dental organizations, which must necessarily be adapted to the food eaten, and which the animal prefers and employs.

The carnivorous animals, having become adapted through countless generations to an exclusive diet,—the flesh of other animals,—have in their dental organization been modified and specialized to accommodate themselves to such a diet, and present forms peculiarly and specially adapted to it. In other highly specialized forms, as the Herbivora, of course the same rule holds true, but it does not hold with animals of mixed diet, in which the dentition is modified and extremes are reduced and compromised to adapt the teeth to varied foods. In the true Felidæ, as in the true Herbivora, however, the teeth are extremely modified to adapt them to an extreme diet, and this class therefore presents an interesting example of high specialization for study.

The whole order of the Carnivora, or flesh-eaters, embracing cats, dogs, bears, and their allies, presents a high state of development. "The canine on each side is very much lengthened, is sharply pointed and recurved for seizing, holding, and tearing prey. The upper canine is separated from the incisors by an interval, a diastema,

the lower canine being received into this space. The incisors are small, short, blunt, and always six in number, and stand nearly in a straight line across the front of the jaw. The outer incisor is sometimes large and pointed like the canine. These anterior teeth are tolerably uniform throughout the order, but the molars vary much in form and number, in accordance with the diet. In the most purely carnivorous members of the order, the Felidæ, the true molars are reduced in number on each side, and the cusps are produced into long cutting-blades, the sectorial teeth. In the bears, on the other hand the molars are more numerous, and are furnished with obtuse and rounded cusps. The fourth premolar in the cats is the largest of the molar series, and is the main cutting-tooth. The crown is divided into two parts,—the one a thin, sharp-edged blade, which runs in an antero-posterior direction, and is sometimes divided by notches into two or more cusps; the other part, the tubercle, is a shorter and blunt cusp, situated on the inner side of the anterior end of the blade. In the pure flesh-feeders the blade is well developed and the tubercle of less size than in the mixed feeders. The lower tooth opposed to this is the first true molar, and in the Felidæ consists solely of a blade which is divided into two large cusps and a rudimentary cusp behind."*

In a general way, the characters which indicate a pure flesh diet are undersize of the incisors, large, deeply-implanted cuspids, wide diastema, reduction of the molar series, cutting-blades on the molars, etc. The true molar is a small tooth, and is scarcely visible from the outside of the jaw. The lower first molar consists of a blade only, divided by a V-shaped notch. The first premolars are much reduced, and often are scarcely visible. The formula of the family of the Felidæ is

$$i\,\frac{3}{3},\ c\,\frac{1}{1},\ pm\,\frac{3}{2},\ m\,\frac{1}{1} = 15.$$

"The blades of the molars pass each other like the blades of scissors, in express relation to the cutting of flesh. The compressed, trenchant part of the molars forms a sharp edge, more or less deeply cleft in different genera. This blade is usually accompanied by one or more basal tubercles. The blade of the upper sectorial tooth always plays upon the outside and a little in advance of the lower sectorial. The upper permanent sectorial succeeds and displaces a deciduous tubercular molar in all Carnivora, and is therefore essentially a premolar tooth; the lower sectorial comes up behind a decid-

* Chas. Tomes, "Dental Anatomy," p. 375.

uous series, and has no immediate predecessor, and is therefore a true molar. In no other forms of animals are the jaws so well and so variously armed with dental organs. The vacancies are only sufficient to allow of the interlocking of the strong canines, which are formidable and efficient weapons for seizing living prey and lacerating and dividing flesh. The incisors are well adapted for scraping and gnawing bones, the sectorials for cutting flesh and dividing the resisting fibrous tissues, and the tubercles for cracking and crushing bones. The jaws are short, the muscles strong, the articulation a mere hinge, so that it limits the jaw movements to the vertical alone.''*

There is not much mastication or insalivation of food in this order, as the flesh food is readily digested. The simple stomach and short intestine indicate also that they subsist on a food easily assimilated. The whole alimentary system indicates a simple diet, which requires but little preparation for assimilation ; it is simplicity itself, when compared with the complicated masticating apparatus and extensive digestive system of the herbivorous animals, whose diet is resisting and unfit for assimilation, and requires extensive manipulation to prepare it for the building of animal tissues.

It is highly interesting also to pursue the subject into the field of evolution, and study the processes and the paths by which such a highly specialized organization arose. Professor E. D. Cope says,† ''The primitive dentition has been modified in two directions, viz : to form teeth for grinding, and the sectorial dentition. The specially-developed teeth of the Carnivora are the canines and sectorials. The successive modifications of forms which have resulted in the existing specialized lower sectorial tooth of the Felidæ consist in the gradual obliteration of the internal and posterior tubercles, and the enlargement of the external anterior tubercles in connection with an additional anterior tubercle. The modification of the characters of the dentition, taken as a whole, consists in the reduction of the number of the teeth and the manner of their specialization. Observation of the movements of the jaws of the Carnivora shows that they produce a shearing motion of the inferior against the superior teeth. This is quite distinct from the sub-horizontal movements of ruminants, or the vertical motion of hogs or monkeys. In the crowns of the sectorials, the inner side of superior and the outer side of the inferior are worn in the process of mastication. The cutting of cartilages and tough tissues

* Richard Owen, ''Odontography,'' 1840, p. 490.

† ''Origin of the Fittest,'' p. 363.

is best accomplished by the shearing of the outer edge of the lower molars on the inner edge of the external tubercles of the superior teeth, in simple tuberculate teeth. The jaw is too wide to shear on the inner side of the inner tubercle of the superior series, the cusps of both upper and lower teeth which engage in this process are developed in elevation at the expense of those not engaged in it, *i.e.*, the internal cusps of the same teeth. The atrophy of the latter is not due to friction, but to disuse ; and the effect of use in lengthening the external cusps appears to have operated in the Carnivora, as it has done in a greater degree in the Ungulata, and the lateral vertical wear resulted in the blade form, or transverse wear. The position of the sectorial tooth is just at the front of the masseter muscle, where the greatest amount of force can be brought to bear upon it, and the last molars are not modified into sectorial teeth in the modern Carnivora, as in some extinct forms, on account, obviously, of the development of the prehensile character of the canine teeth. The prehensile character of the sectorial teeth or the premolars was lost with the development of the canines, and extinct forms snapped their prey, as is seen in some existing dogs with long jaws, which does not permit of the lacerating power of the canines, as in the Felidæ. The latter have the masseter muscle situated more anteriorly, in order to render the canines more effective. This muscle has advanced from behind forward in the development of the carnivorous types, and the only accessible molars—the fourth above and the fifth below—have become specialized as sectorials, while the fifth, sixth, and seventh have, firstly, remained tubercular, as in the dogs, or, secondly, have been lost, as in the hyena and the cats."

Dr. John A. Ryder, in describing the mechanical genesis of tooth-forms, says,* "The dentition of the Carnivora or Feræ is bunodont, the jaws wide, with the tubercles laterally compressed into sharp edges to cut prey. The mandibular movement is ginglymoid, and admits of the least lateral movement ; all that is admissible is that which is effected by the lateral sliding of the cylindroid condyles in the glenoid cavities, but the effect is, however, widely different from the lateral movement observed in the Ungulata. The passage from the archetype bunodont tooth to the scissor-like (carnassial) sectorial form is plainly exhibited by selecting a series leading from the lowest of both ancient and modern forms up to the Felidæ, as the center of specialization. The characteristic cylindroid condyle of the cats is probably

* Proceedings of the Academy of Natural Sciences of Philadelphia, 1878, p. 45.

formed to resist the pulling action which these animals exhibit when holding down prey with the paws, as this prevents the drawing of the jaw forward." This compels the single movement of opening and closing the jaw, and this gives rise to the peculiar form of tooth with sharp blade-like cusps, so well adapted to the food employed. The tooth is developed in a vertical direction on account of vertical movement, but not laterally, as in the Herbivora, which have lateral movement of the jaws. Types of teeth have been developed in accordance with the amount and direction of mandibular movement, and the teeth of the Felidæ are formed in accordance with this rule. Cusp duplication is effected by this movement, as pointed out by Professor Cope and Professor Harrison Allen,* by the thickening of the tooth in a lateral, longitudinal, or oblique direction in obedience to growth-forces. "The development of a bicuspid or quadricuspid tooth is effected by repetition of the cuspid or incisor forms, by the functional development of cingules at the base of the crowns which are developed into cusps." In this manner repetition of cusps arose and duplication became possible. In the ruminating Ungulates this duplication is more extensive than in the Carnivora, in which a simplicity in this respect is maintained, but a complexity in the growth of the cusps is manifested for a special purpose.

The most highly specialized teeth in the Felidæ are therefore the sectorial premolars and the prehensile canines, which are characteristic. These teeth place this family at the head of the Carnivora as the most highly specialized members of the order. They furnish an example of dental variation that is quite remarkable when studied in its minutiæ. Other orders also give examples of extreme specialization which are quite interesting and instructive.

DISCUSSION.

Dr. Barrett: I wish, first of all, to congratulate the society upon having attained to a hitherto unapproached eminence. For the first time in its history have I witnessed a full meeting patiently listening to a strictly technical paper upon a strictly scientific theme. Heretofore the mere announcement of a paper like this has been followed by an exodus to the dental depot rooms or to the street. Now we have witnessed the cheering spectacle of almost the whole of the membership giving close attention to a paper which they would have despised a few years ago. Truly we are growing, and there is yet hope for the

* *Dental Cosmos*, Vol. XVI, p. 617.

American Dental Association that it shall lead in profound thought, as it does in the more practical affairs of dentistry. The presentation of such a paper as this, and its passage without any discussion, would seem to mark an indifference on the part of an intelligent profession. It seems to me if we pretend to any erudition whatever, we must consider something besides that by which we earn our daily bread. There is nothing scientific about filling teeth; that is merely professional work. But when we consider dentition in its broadest sense, in all the vertebrate and invertebrate world, then we reach beyond mere professional bounds and emerge into the grand domain of general science. The paper under discussion is such a scientific paper. It rises above the mere plane of professional work, and considers grand, systematic, general principles. That is something worthy a society which desires to stand as the representative of advanced thought in dentistry.

I could have wished that the author had not followed the text-books quite so closely, but had given us something besides Huxley and Owen. Most homologists have followed the mammalian classification of Cuvier. Yet it seems to me that his odontography is faulty, and that Owen has given us a better classification, so far as the teeth go. Cuvier divides the molar series into false molars, carnassials, and tubercular molars. The carnassials are what Owen denominates the sectorial teeth, and it is these that the paper under discussion chiefly considers. They are the last premolar and the first molar of the Carnivora. Then the formula of the genus Canis, according to Cuvier will be—I will place it on the blackboard—

$$\text{i } \frac{3-3}{3-3},\ \text{c } \frac{1-1}{1-1},\ \text{false m. } \frac{3-3}{4-4},\ \text{carnassials } \frac{1-1}{1-1},\ \text{tubercular m. } \frac{2-2}{2-2} = 42.$$

The more common formula would be

$$\text{i } \frac{3-3}{3-3},\quad \text{c } \frac{1-1}{1-1},\quad \text{pm } \frac{4-4}{4-4},\quad \text{m } \frac{2-2}{3-3} = 42.$$

Cuvier's method divides the teeth according to their form and size, and not their position. But this leads him to find carnassials where they do not really exist. In Ursus, for instance, all the molars are tubercular, the bear not being a true carnivore, but omnivorous. Cuvier gives Ursus,

$$\text{false molars } \frac{3-3}{4-4},\ \text{carnassials } \frac{1-1}{1-1},\ \text{tuberculars } \frac{2-2}{2-2} = \frac{12}{14}.$$

Yet this genus really has no carnassials.

If there be a great archetypal dentition in the Ungulates, it would be, in my opinion, that of forty-eight teeth, as follows :

$$i\,\frac{3-3}{3-3},\quad c\,\frac{1-1}{1-1},\quad pm\,\frac{4-4}{4-4},\quad m\,\frac{4-4}{4-4} = 48.$$

Yet we do not find this commonly existent to-day. That of Equus, for instance, is

$$i\,\frac{3-3}{3-3},\quad c\,\frac{1-1}{1-1},\quad pm\,\frac{3-3}{3-3},\quad m\,\frac{3-3}{3-3} = 40.$$

That of Sus is

$$i\,\frac{3-3}{3-3},\quad c\,\frac{1-1}{1-1},\quad pm\,\frac{4-4}{4-4},\quad m\,\frac{3-3}{3-3} = 44.$$

Thus in the horse we find a loss of both premolars and molars, while in the hog, as may be seen from the above formula, the loss is in the molars alone.

In the modification of dentition, the first suppression usually seems to be of the posterior teeth. In the Felidæ, to which the paper is devoted, this is distinctly marked, the typical dentition being this :

$$i\,\frac{3-3}{3-3},\quad c\,\frac{1-1}{1-1}\quad pm\,\frac{4-4}{3-3},\quad m\,\frac{1-1}{1-1} = 34.$$

In this genus it will be seen that but one molar is left. But the premolars are materially modified, while the cuspid is inordinately developed.

Time fails me to trace the homologies further. But the theory that the development of the canine tooth, or of the sectorial teeth, is steadily proceeding, fails when we come to consider some of the fossil carnivores. In the collection which I took to New York last winter, and which is now in the rooms of the Odontological Society in that city, there are casts of the jaws of a fossil feline in which the canines are developed to an enormous size, by far exceeding those of any species of to-day, while the sectorial teeth are but moderately marked. In making a study of the dentition of the Felidæ, therefore, the early forms must be taken into the account or we may be led into error. The Pinnipedia have a dentition closely related to that of the felines in the Fissipedia. The teeth of the common seal are thirty-four in number, and they have but the one tubercular molar. But the sectorial teeth are not so strongly marked as in the felines, nor are the cuspids quite as prominent.

But it is not the forms of the teeth of this genus which present the greatest modifications. Look again at the formulæ which I have placed upon the board. You see the loss of teeth from that which I

have adopted as the typal mammalian dentition is altogether in the posterior portions of the jaws. The full number may be found in the premaxillæ. In the Quadrumana the suppression is among the anterior teeth. Of course it is the case that where premolars are lost they are those next the diastema, if there be one. In the Troglodyte gorilla it is not an uncommon event to find the fourth molar well developed, though I have never seen a specimen in which it was found in both jaws, the mandibular always lacking it. In the Primates it is from the premolars and incisors that there has been a suppression. But the premolars are tuberculous, and not specialized, while in the Felidæ the opposite condition prevails; the premolars are not suppressed, but are materially modified, especially the last, which, by the way, is peculiar in another respect,—it is not preceded by a deciduous tooth, and hence is not a true premolar at all.

Many homologists claim, and I think Dr. Thompson also holds to this belief, that these modifications are produced by the necessities of their existence,—by that which forms their food. This is a question which it is quite impossible definitely to determine. It brings up the old problem, Did the first bird come from the egg, or the egg from the first bird? It does not necessarily follow that either was the case, if the doctrine of evolution, which is almost universally accepted in science, be true. There may have been an evolution from some other less specialized form. Canis, so nearly related to Felis, and which has larger teeth of the same character, shows a less specialized dentition, but there is no reason to suppose that this family preceded the Felidæ, and that the latter are a still further modification from the great archetype of mammalian dentition, if we may accept of one.

That some of the teeth of Homo, and especially the wisdom-teeth, are in a state of gradual suppression seems to me quite probable. You may answer, that during the historical period there have been no perceptible indications of a change. But the historical period is but as the stroke of the pendulum in comparison with all the time that has fled into the past. It is altogether too short to express any positive indication. I have repeatedly seen in the Primates a fourth molar that could not be considered in any sense a supernumerary tooth; it evidently belonged in a perfect succession, because it has all the development and proportions of any of the molars. That there has been a suppression of incisors is proven by the occasional utterance of a third incisor on each side. There has, then, undoubtedly been a modification in the human dentition from its nearest prototypes. There has also doubtless been a modification in the Felidæ. I am not here

to urge the claims of evolution by any means. This is commonly comprehended to imply the descent of man from an inferior animal—"Was your grandfather a monkey?" When anyone utters that flippant criticism he simply advertises his ignorance. The true doctrine of evolution is that from the single organic cell there began a differentiation in the development; in one direction it finally resulted in the Felidæ; in another in the Ungulata; in yet another in Rodentia; and in still another direction under Divine guidance it culminated in man; but that man was ever a monkey, or a monkey a long-tailed rat, is not evolutionary doctrine. The differentiation has been for all time in different directions. But that the dentition has been modified by the surroundings and by environments, it seems to me, is clear and unmistakable, and if the number of teeth has been modified by the environment, it is quite possible that the very form and shape of the teeth may have been changed also.

Cuvier's method of nomenclature is based upon the forms of the teeth, and that is not entirely accurate, for the shape of a tooth does not always indicate its office.

There are a great many dental problems to be worked out, and I know of no class of men more competent to do it than the dentists. Certainly none have a better opportunity for the study of it, for to no one is it so near his daily work as it is to the dentist. If these questions are ever to be solved, they should be answered by the dentist, and I feel that the direction of the professional mind should be turned to these scientific matters. We have been altogether too practical. We should get to a point where we can look at something besides amalgam and red rubber. We should reach a position in which we will be upon the plane of scientific men, and when we attain to that we shall be accepted by the world as belonging to a liberal profession. But so long as the great body of dentists sneer at scientific culture, with the remark, "That ain't dentistry," and are impatient when in our meetings some question which does not immediately involve our bread and butter is broached, so long will we be classed by educated men as mere pretenders in the field of science.

Dr. Peirce: When a paper such as Dr. Thompson's is read before our body, the query comes at once, Can we draw from it a lesson and make it applicable to our daily labors? Can it be made available in our specialty? In the few moments allotted to me I will see whether this is not possible. We have learned from our previous studies, as well as from the paper just read, that the Carnivora embrace three or four varieties. They are all flesh- or fish-eaters, they vary in their

habits and in their habitats, or environment, and in proportion as they vary in these, so do their teeth vary. In proportion as they have become specialized in their living, so have their teeth become thoroughly adapted to their habits of life, to their food-habit especially, and just in that proportion has the number of their teeth been reduced. That is the law. As an animal becomes specialized in his habits the number of teeth is never increased, but invariably lessened. There is no case on record where the number of teeth has been increased on the ancestral type. That fact especially I want noted. You all know that the typical number of teeth for the horse for centuries has been forty-four, and that has been considered the typical number also for the order of Mammalia. Now, the modern horse, or, if you please, the best-bred horse, has four of those teeth rudimentary, so he has but forty permanent teeth. The specialization of that animal has lost him four teeth. Whether that is due entirely to diet, or whether it is due to intensification of his nervous system, is an open question. The probability is that both are factors. You are familiar with the fact that man, belonging to the order of Mammalia, indulges in an omnivorous diet. In consequence of this the teeth are asking the question, "Which way?" and when this is answered the specialization will show a better adaptation to their needs—to their uses. My own impression is that one of the principal factors in the decay of the human teeth is because they are in a transitional condition. The human family is not old enough yet for the teeth to have become specialized, and until we become fixed in our diet we shall have the same uncertainty in their durability, number, and shape. You all know that the human family is looking toward the loss of four teeth ; thirty-two is the number we now look for, but how many patients do we find with only twenty-eight? That is in the line of specialization.

Then, again, let us take the races that live entirely upon vegetable food,—rice,—as the Chinese. What do we find ? A very marked suppression in the cuspids or canines because of the absence of meat diet. These are the carnivorous teeth. We find also a marked increase in the size of the incisors, to compensate for the suppression of the marked characteristics of the canines. I make that assertion based upon observation and conversation with men who have traveled and worked for and among that class, not from my own actual observation. It must therefore be taken with that degree of uncertainty which such information warrants ; but if it is true, it is in the same line, and instead of our repeating or tolerating the suggestion which has oftentimes been expressed, that the human family would eventually become edentulous,

let us say the human family would eventually have just the number and shape of teeth that is established by their habits. If you can pick out from your patients the families who live upon solid diet, upon dry food, and use their teeth in mastication, without washing down every mouthful with some liquid, you will have those with whom you have the least trouble in saving their teeth, and in whose teeth fillings last better and whose mouths will be purer and cleaner in every respect. Record the facts, and you will find that the patients who give you the least trouble are those who masticate their food and eat it dry.

Dr. Carroll: I did not have the pleasure of hearing the paper read, but I had the pleasure of hearing the remarks of the gentleman from Buffalo, as well as those of the gentleman who has just taken his seat. I wish to make one observation touching a remark Dr. Peirce threw out. He said that the loss of the canine teeth in the Chinese or in the rice-eating people,—vegetarians,—indicates a specialization; that is, that they are being specialized in a certain direction. That goes to contravene a conception I have had regarding the use of the canine. The term canine or dog tooth is a misnomer as applied to man. The canines are not for tearing, as dogs tear. If you watch the nut-eating animal called the gorilla, or the monkey, or any of that family, you will see that he takes the nut and carries it back of the bicuspids, on to the molar, and carefully places it there with his tongue and with the organs surrounding, and he feels his way before he cracks that nut, and in feeling his way he passes the lower cuspid beneath the upper cuspid before he brings his jaws together, and he then cracks the nut. What does that teach us regarding the monkey? The same thing that it teaches us regarding man, that the incisor teeth are for cutting the food, which by the tongue and cheeks is carried past the cuspid teeth to the bicuspids, the meshing teeth, and thence to the molars to be finely ground, showing in the act of mastication that the cuspids perform no masticating act, such as tearing, cutting, meshing, or grinding, but rather serve the office of a dowel-pin, to give secure occluding direction and stay to the superior and inferior maxillæ in eating; hence it is not clear to me that there is any specialization indicated when it is stated that rice-eating people, such as the Chinese, have imperfectly-developed cuspid teeth.

Dr. Barrett: The remarks of the last speaker are too fanciful for serious consideration.

There is one single thought which leads us to a broader view of the subject, and that is the fact that if we consider the Australian continent we there find the dentition entirely modified. All of the animals indig-

enous to that region were probably originally marsupial. They had a peculiar modification of the molar teeth, in this, that the type is reversed; that is, the typal number of the premolars and the molars is completely inverted. The Carnivora indigenous to Australia are marsupial Carnivores, the Rodentia are marsupial Rodents, the Ungulata are marsupial Ungulates. I mean that as far as their dentition goes they have been modified to the type of the marsupials. This applies to the animals that are indigenous to the Australian continent; not to those which have been introduced from the other continents. When you take that into consideration, with some of the other facts which have already been named in the paper and during the discussion, we find that it leads us to certain conclusions which cannot by any possibility be avoided. Those conclusions you can yourselves draw from the facts.

Dr. Truman: Professor Peirce states that there are thousands of families where they have lost the wisdom-teeth entirely. What evidence has he of that? I understood Dr. Peirce that the cuspid teeth are typical carnivorous teeth. I have always been taught that the sectorial tooth of the cat (Felis) is the typical carnivorous tooth.

Dr. Peirce: The doctor confounds a remark in the paper with the remarks I made. Dr. Thompson's paper stated that Professors Cope and Allen stated that the typical carnivorous teeth were what we call the cuspid teeth and the sectorial molars,—those two were the typical teeth of the Carnivora, and I don't know that I repeated it. He asks what grounds I have for stating that there are thousands of individuals where the number of human teeth has been reduced to twenty-eight. I base my statement on this fact: I have at least twenty in my practice where that tooth never has and never will appear, so I am justified in saying that there are thousands where it never has and never will appear. So common is this fact that the scientific world recognizes it. It is noted in all the scientific books that the human family are fast losing four of their permanent teeth, largely the third molar, but in many families it is the lateral incisor. It is the lateral incisor more frequently in this country than in foreign countries, I am told. That, I think, has not been established by evidence. But it has been established by evidence that the third molar is gradually disappearing from the human family. If we go back to the animals that are supposed to be ancestral, or so closely allied to the human family, we find first thirty-six teeth, then thirty-four, then thirty-two. Some of the monkeys have thirty-four teeth and some of the Lemurs thirty-six teeth, and the teeth are not crowded. We take the gorilla and the

lower races of men, and we find thirty-two teeth, all in place, with abundance of room between the third molar and the ramus; not only that, but we find the third molar equally as large as the first and second. I have examined many jaws in the Academy of Natural Sciences, and I find in many of those ancient jaws the third molar fully as large as the first. What is the argument? In the human family to-day the third molar is invariably smaller than either the first or the second. The conclusion we draw is the tendency to suppression.

Dr. Truman: You assert that the wisdom-tooth, because it is not present in the jaw as you examine the mouth, is not present in the jaw at all. Suppose you were to make an autopsy of that jaw and you should find the wisdom-tooth somewhere in the ramus of the jaw, what would you suppose?

Dr. Peirce: Simply the line of separation. There are hundreds of third molars that have the germ started, but which are never perfected, while there are many jaws where the germs are not to be found at all. I find third molars coming through at fifty years of age. There was not room for them, and they are imperfect in development. I think it is universal that the third molar with the human family is invariably smaller than the first or second, and not only smaller, but its use there is always doubtful. You take the record of the destruction of teeth after the age of twenty-five. Which of the molars is most frequently lost? The third molar. It is the perishable tooth after the age of twenty-five years.

Dr. Barrett: I would like to ask Dr. Peirce if he desires to make the positive assertion that any of the monkeys have thirty-six teeth, and if he does, can he give the class. In the Lemurs, which indeed belong to the quadrumana, this is the case, but I know of no family in either the Catarrhina or the Platyrrhina, the old or the new world monkeys, which has this dentition.

Dr. Peirce: If I said the monkeys, I meant the Lemurs. Some of the monkeys have thirty-four; others, the chimpanzee and gorilla, have the same as man, thirty-two, for the permanent set.

Dr. Truman: What is the cause of the development of the cuspid tooth in the vegetable-feeders, if it represents the carnivorous type?

Dr. Peirce: It is simply a transmission of an ancestral condition. The vegetable-feeders have probably not been long enough vegetable-feeders to have produced the suppression of that characteristic.

Dr. Truman: Take the camel (Camelidæ), what about that?

Dr. Peirce: I am more familiar with our domestic animals. I

cannot speak especially of the camel. I do not know how long it has been a vegetable-feeder, but my impression regarding their cuspid is that it has been developed to its present prominence as an organ of prehension.

DR. BROPHY: I understand Professor Peirce to say that the third molar in the human subject is invariably smaller than the other molars; is that correct?

DR. PEIRCE: In the human family to-day,—I did say that.

DR. BROPHY: Is it not a fact that you frequently find the third lower molar larger and broader than any molar in the mouth?

DR. PEIRCE: Not invariably, but occasionally it is found so.

DR. BROPHY: The interesting discussion on this subject will not be greatly lengthened by what I have to say. Although I have not been a close observer of the conditions that have been so learnedly discussed, I have observed this, that the lateral incisor is almost as frequently found absent as the third molar; and in conversation with Dr. Black, of Jacksonville, not long ago, he agreed with me that this was so. It may be that through this process of evolution the third molar will disappear in time. I am convinced, however, that the lateral incisor has disappeared absolutely in certain families. I think other gentlemen will verify that there are families in which it has been absent at least three generations. What are we to conclude from that? This may not be in the exact line of the scientific discussion that has been engaged in this morning, but the fact exists. How are we to account for it?

DR. PEIRCE: I want to make one remark in regard to the loss of the lateral incisor. I merely give this as the result of my observation; I do not give it as an established fact. Dr. Brophy said very truly that there are families where the lateral incisor is deficient. The deficiency of the lateral incisor in one or both parents will more likely cause it to be transmitted to the child than the deficiency in the third molar. The deficiency in the third molar comes through an evolutionary process. There is something else causing the deficiency in the lateral incisor, and when that exists in either of the parents it is more liable to be transmitted than where there is a deficiency in the third molar.

DR. MORGAN: Dr. Peirce assumes that this loss of the lateral incisor and of the molar is the result of non-use of the tooth, if I understand his views.

DR. PEIRCE: The third molar, not the lateral incisor.

DR. MORGAN: That it is lost because there is no longer any use

for it. What I want him to tell me is this: The inferior incisors are not lost. They are of less use than the superior. In the inferior maxillary they are of less importance to the individual for any of the purposes for which they are used, and yet we find them lost in the superior maxillary while they are retained in the inferior. If his theory were correct, they would be lost alike in both maxillaries, it seems to me, or more in the inferior than in the superior.

DR. PEIRCE: The doctor is correct when he says that I assume the third molar is lost because of its non-use, but he is mistaken when he says I assume that such is the case with reference to the lateral incisor. I said distinctly it was not subject to the same law. The third molar is subject to that law of specialization, but not the lateral incisor, in my estimation.

DR. MORGAN: Why not all of the upper teeth under the same law?

DR. PEIRCE: I can only give you the results of the facts as they exist. I don't know why not. All through the animal world the loss has been with certain animals of what we call the premolars. The higher monkeys have lost a premolar and not the third molar; man has lost two premolars, and not a third molar. Now the question comes, Is the third molar being suppressed for want of use and room in response to the law of specialization? I think so.

DR. M. L. RHEIN: Dr. Morgan has just echoed my sentiments on this question. If the specialization of the human race is tending toward the loss of certain teeth, the incisors could not be such teeth. When do we meet with loss of the inferior incisors? Has anyone ever seen such a case? The frequency of our finding superior incisors lacking is well known. It does not, however, necessarily follow that their absence is due to the same cause that seems to be bringing about the gradual loss of the third molars in the human race. Such reasoning is purely theoretical, and as the lack of some superior incisors can be distinctly traced to a more rational source, we ought to adopt a more reasonable theory. There are two patients in my practice who never possessed superior lateral incisors. Their mothers never had any. Where the roots of the laterals ought to be can be noticed well-marked gutter-like depressions of the maxilla. In both cases there is a history of an operation for the cure of a double harelip. The theory I would advance in both of these cases is that in operating for harelip on the infant the germs of the laterals situated in the intermaxillary bone were destroyed. Heredity has played the rest of the part. It is almost impossible for an operation for the closure of harelip on the

child to be performed without destroying the germs of the lateral incisors. Very frequently the central incisors suffer the same fate. It is even possible to destroy the germs of the cuspids in this way at a certain age. The operation for the closure of the harelip is so common with our surgeons that it is not surprising that we should find many people suffering from a loss of superior incisors due to this cause.

DR. MARSHALL: Did I understand Professor Peirce correctly when he said man had lost a premolar?

DR. PEIRCE: As compared with the lower animals.

DR. MARSHALL: Does Professor Peirce really mean to say that we are descended from the monkey? It seems to me we need better proof than that which he has presented. That is simply an assumption. I should like, for the satisfaction of this body, that he would give us some facts to prove such a statement. I never have learned that in any pre-historic skulls that have been found there were three premolars on each side. I never saw such a statement made in print by anyone, and I never heard such a claim made before.

SECTION VI.—Continued.

Diseases of the Oral Mucous Membrane.

Paper by J. D. PATTERSON, of the Section.

SOME of the diseases of the oral mucous membrane, their pathology, and their effect upon the dental organs,—the teeth,—will be the points considered in this article.

It behooves the dental profession to take cognizance of the fact that this subject has been very much neglected, because its importance has been underrated. Until the agitation brought about by investigation of the disease called pyorrhea alveolaris, there had been little attention to diseases which were of the mucous membrane *per se*. Since then investigators, although laboring under misconceptions, have recognized more than they did the importance to the intelligent dental practitioner of a thorough knowledge of the etiology and pathology of these complaints.

Much is still undecided, and the diffusion of such knowledge as may be said to have become generally accepted goes on very slowly.

The inception of the irritation by which we have disease of the oral mucous membrane may be divided into classes. It may be accidental, constitutional, or hereditary. Investigation and observation compels the belief that the active causes are seldom hereditary; they are oftener acquired conditions, but very largely due to the accidental in their inception, hereditary or constitutional factors merely acting as predisposing conditions.

I desire in this article to especially call attention to some of these accidental causes. We find that they are very numerous. The irritation may be mechanical alone, may result from the invasion of microorganisms, from lack of hygienic care, from disuse, from infection, or from functional disturbances without mechanical aid.

We will first consider the cause of disease in this membrane by an

arrest or disturbance of its function. The dental profession have not given so much thought to this particular line of investigation as to the search after irritants found in calcareous irritation, to microbian theories, or constitutional conditions, and therefore, we believe, have signally failed to explain the etiology of certain symptoms often found in this membrane, especially in the early stages of pyorrhea, where no irritation, constitutional or active, could be found; the disease being established, passing through its different stages from irritation to suppuration and loss of tissue, and giving to the observer nothing of its etiology, except in theories unsupported by any clinical fact. Our purpose is to study this membrane and endeavor to point out where the obscure irritation arises.

In glancing at the anatomy of the oral mucous membrane, it may be briefly described as a layer of epithelium with a connective-tissue framework, and glands underneath supporting the epithelial layer, and provided with blood-vessels, lymphatics, and nerves. The glands are of the tubular character, and are imbedded in the connective-tissue framework. Their function is to produce mucus. In health, mucus of normal quantity and quality is constantly produced. It is of a transparent, watery color, diffused over the surface. It serves to keep the parts moist, pliable, and in a state of comfort, and protects from the irritating influence of external matters.

The epithelial layer is in a constant condition of growth of the deeper and desquamation of the superficial cells. Whatever interferes with and changes this normal and physiological condition and function in this membrane may overcome its power of resistance, and disease will result. The oral mucous membrane is especially liable to changes in temperature, which interfere with its health. The effect of lower temperature, often met with in external causes, will be found to be a chilling of this membrane, which contracts its epithelium until the mucous ducts are prevented from pouring out their secretion, and functional derangement is thus established. This is commonly termed "taking cold." Any marked deviation from the normal heat of the tissues, viz, 98° F., may result in morbid changes.

Heat-production is going on all over the body. When any of the tissues are subjected to cold, this heat-production is stopped and morbid action comes. In the mouth the contraction of the mucous membrane is the first step, accompanied by stoppage of the mucous secretion. Quickly succeeding this we have increased nutrition, an overproduction of the mucous secretion on account of increased blood-supply, which is the result of irritation from disturbed function;

a slightly reddened tissue follows from the same cause, and an abundant effusion of serum escapes; the epithelium cells fall off more rapidly than under normal conditions. As the inflammation progresses, and stasis and the other classic signs of inflammation ensue, we see the mucous discharge rapidly becoming purulent, because so many unripe cells quickly become pus-cells. Micro-organisms now make their appearance, and assist in the advanced stages of the disease. This process soon extends below the epithelium, and the membrane, becoming infiltrated with depraved cell-elements, swells and thickens, the inflammatory products resulting in suppuration in convenient territory.

Let it be borne in mind that until the advanced stage in the conditions described, there is not of necessity any presence of pathogenic or non-pathogenic micro-organisms. The irritation in its inception has been simply through an arrest of function. Neither have there been of necessity any hereditary or constitutional favoring conditions, without which these results would not have been manifest. Favorable hereditary condition of tissue and constitutional environment are in these cases merely predisposing factors. In other diseases of the mucous membrane exhibiting similar symptoms it is not to be doubted that constitutional conditions and peculiar diatheses figure largely, and that under such conditions and with the presence of pathogenic micro-organisms the mucous membrane is involved even at the inception of disease; but there are greater factors which explain some symptoms without seeking in the field of bodily conditions, micro-organisms and mechanical irritation.

I pass now to another irritant of the oral mucous membrane, viz: the prevalent habit of "mouth-breathing." Leaving out of the question the change in the temperature of the mouth by this habit, we find that respired as well as inspired air rapidly dries the surface of the mucous membranes, destroying the moistened lubricating surface, stopping the mucous ducts until the same train of symptoms from disturbed function already described is established. When a subject presents who from one cause or another breathes through the mouth, the intelligent operator can certainly predict the condition of the oral mucous membrane. It will be found in some of the varied stages of inflammation, acute or chronic, modified in extent by the degree of hygienic care bestowed by the patient.

Here we have again a numerous class of cases where undeniably the disease has arisen from the simple drying of the naturally moist, lubricated surface by the introduction of an atmosphere which is not

normal to the tissue. No micro-organisms need be present, nor has calcareous or other irritant matter or bodily predisposition anything to do with the real inception of the baleful line of results.

The condition described as arising from interference with the function of the oral mucous membrane is not entirely and exclusively pathognomonic of irritation from mouth-breathing, or shock, or the result of thermal change. These symptoms may result from many different causes. They are seen in infection from catarrhal, croupous, diphtheritic, or tubercular surroundings. They are superinduced also by medicinal treatment, by mechanical irritants, and by uncleanliness.

In this last cause is found the etiology of by far the greatest number of diseases of the oral mucous membrane. We find, however, that while the cause of the described conditions may be varied, and while the cause will measurably affect the malignancy of the disease, yet the pathological symptoms are very similar, and we are brought in contact with a *condition* which follows from *numerous* active causes.

This *condition* is a disturbed function. A physiological protest arises, profuse discharges ensue, inflammatory processes are established, which end in suppuration. The same clinical aspects are found in the nasal tract, in the pharynx, and all connecting cavities of the upper air tract. The chief symptom is an abnormal secretion or discharge of mucus or muco-pus, and—I care not that objection has been made by some authors to the application of the term "catarrh" to a lesion in the oral cavity, yet—a catarrh it is, just as inevitably as any fact established in pathological conditions. I repeat, however, that catarrh is merely a condition or symptom, and is present in many differently-caused diseases affecting the oral cavity and the upper air tracts.

In the oral cavity the train of symptoms we have described meets with conditions which rapidly determine and further the inflammatory processes. The teeth are surrounded by mucous membrane, whose union with the teeth forms a somewhat abrupt break in its smoothness and continuity, affording a nidus for irritating matter to lodge and ferment. The gingival margins, it is well known, rapidly become the focal points of disease. At this margin, then, we find the most noticeable results of the loss of function in the mucous membrane. Through continued inflammatory action we soon have destruction of the normal union of the tissue to the tooth, and then ensues the train of pathological conditions so well known and often described as pyorrhea alveolaris; which is simply a stage in the disease naturally resulting on account of the peculiar anatomy of the region, a sequence

of preceding pathological disturbances, easily traced, and in favorable conditions surely following.

In speaking of diseases of this mucous membrane of the mouth resulting in what is familiarly known as pyorrhea alveolaris, different authors have expressed themselves strongly opposed to the use of the term catarrhal in describing the clinical appearance. They take this position because they are laboring under an entire misconception in regard to the term. They consider catarrh a *special, peculiar* disease of certain membranes which ultimately leads to ulceration and necrosis, when it is *not this at all;* it is simply a *condition*,—a condition of discharge,—and not a disease of special cause or pathology.

Another somewhat prevalent idea entertained by the medical as well as the dental profession is, that there is a catarrhal *diathesis*, a peculiar systemic condition, under which a patient speedily becomes liable to catarrhal inflammation. In regard to this, the celebrated Dr. F. H. Bosworth says, "I know of no such condition, and there is no good ground for the assertion. My clinical experience also fails to justify the view in any manner" (p. 101, "Diseases of the Throat and Nose"). The fact is that the best clinical experience and observation of specialists in diseases of the mucous membrane agree that the conditions of the mucous membrane here described are, with few exceptions, of local origin ; that the constitutional disturbance is only secondary, and that for the most part only local treatment is demanded.

Another argument against classifying these diseases of the oral mucous membrane as catarrhal comes from those who lay great stress upon climatic influence. They find in climates where catarrhs are almost unknown many cases of pyorrhea, and, on the contrary, where catarrhs are endemic find no increase in the number of those suffering from discharges from the oral mucous membrane.

In regard to this, I think it must be considered a very loose statement, for, in the first place, statistics in the premises gathered by those who have devoted their lives to the treatment of diseases of the mucous membrane prove that those diseases are not peculiar to any climate or country. It was formerly supposed that these diseases were more prevalent in America than in Europe, but this has been disproved. It was found that they had received more attention from specialists in America at an early date, and so catarrh was called an American disease. It has been found, however, that it is equally prevalent in Europe.

There can be no question that a change of climate works wonders

in catarrhal troubles once they are established, "but that climatic influence is an important factor in its causation is open to question" (Bosworth). The highest authorities agree upon this point.

In leaving the question for your discussion, I suggest the following considerations:

1. That the inception of disease in the oral mucous membrane, where the cause is obscure, is often to be found in the arrest of function in that membrane by thermal shock, by "catching cold," or by mouth-breathing, by which the moist, lubricated membrane is destroyed, rather than by hereditary conditions, constitutional diathesis, or the invasion of micro-organisms.

2. That the irritated mucous membrane which we find weeping out an abnormal quantity of mucus or muco-pus is not pathognomonic of any special irritant, but is simply a condition.

3. That this condition is properly termed "catarrh."

4. That catarrh is not a special disease, but is merely a *condition* of disease.

5. That the name pyorrhea alveolaris simply denotes a stage in catarrh of the oral mucous membrane, is not pathognomonic, but may result from a great variety of causes.

SECTION VI.—Continued.

Phagocytosis.

Paper by H. A. SMITH, of the Section.

A CORRECT knowledge of the nature and life of cells forms the basis of physiology.

A cell may be defined as a nucleated mass of protoplasm of microscopic size which "possesses sufficient individuality to form a life history of its own." Originating from some pre-existing cell, it grows, reproduces itself, and dies.

The vital or physiological activities of protoplasm may be studied in the amœba. They are :

1. Power of spontaneous movement, called amœboid movement.
2. Irritability and power of response to stimuli.
3. Nutritive powers : the ability to take in food, and build up tissues by assimilation, and to reject what is not assimilated.
4. Reproductive powers.
5. Decay and death.

Our purpose now, however, is to call attention to the white corpuscles or leucocytes of the human blood, and to refer especially to their amœboid movement, first described by Wharton Jones. These leucocytes are simply spherical masses of protoplasm without cell-wall. The power of spontaneous movement is manifested by the mass in lengthening itself in one direction, and then flowing the whole mass into the process, and thus the cell changes position. Its nutritive power is exhibited through this prolongation or tentacle in seizing the food and drawing it into its mass. Because of these vital or physiological qualities, the white blood-cells have been called by the eminent Russian zoölogist, Metschnikoff, phagocytes, or devourers. In the popular scientific literature of the day concerning these cells, they have been called warrior-cells, eating cells, wandering cells, chimney-sweeps of the

blood, etc., names indicating that in a way peculiar to themselves they assist in purifying the blood. Having the ability to seize upon the waste products of the system, it is also supposed that the phagocytes prey upon all small foreign bodies in the blood, organic or inorganic, dead or living, including diseased germs and all invading bacteria.

The plausibility of Metschnikoff's phagocytic theory and its acceptance by some of the best-known morphologists of the world has suggested that perhaps some of the mysterious phenomena observed in the treatment of disease by the dental practitioner might be explained by the devouring function of the leucocytes.

In the January number of the Buffalo *Dental Advertiser*, Dr. Frank W. Low has given us an interesting paper entitled "Phagocytosis." Following an exposition of the theory, he says, "In the existence of the phagocytes we have an intelligent explanation of the successful outcome of much of the careless immediate root-filling which is undoubtedly being done the whole country over." He believes that when teeth, treated with dry hot air and mechanical cleansing, speedily assume healthy relations with the surrounding tissues, the phagocytic cells act as the factors of elimination, devouring all bacteria both in the pulp-canal and in the tissues about the apex of the roots. Dr. Low ventures the opinion that phagocytes may penetrate the dentinal tubuli of the root from the pulp-canal. It is doubtful if the smallest blood-corpuscle could enter these tubuli, especially if the root-canal is surrounded with a dense layer of dentine, as recently described by Professor Miller. If the dental pulp is invaded by putrefactive micro-organisms through a point of exposure or by way of the vessels entering the pulp through the foramen, these wandering cells may and probably do enter with the blood supplied to the pulp. Dr. Low believes that when stasis is complete the battle goes against the phagocyte, because reinforcements cannot come to the rescue, while the bacteria proliferate without hinderance in the dead pulp-tissue.

Pulps sometimes die from injury to teeth, the crowns of which are sound. In these cases the pulp may or may not become putrefactive. In those cases in which the pulp atrophies or remains moist and, as we say, sweet, it may be assumed that the bacteria circulating in the blood and carried to the injured tissues at the apical space have not entered the pulp. In cases in which the injury has been severe and inflammation confined more nearly about the apex of the root, we are less likely to have a putrefactive pulp and attendant abscess. The severe injury is followed by prompt and decided inflammatory reaction, in which the leucocytes pass out freely into the inflamed

area and readily devour the pyogenic cocci present in the damaged tissue.

Dr. Low gives the details of several bacteriological experiments with teeth containing infected pulps, and concludes: "But one inference can be drawn from results observed: that the phagocytic cells act as the factors of elimination, devouring all bacteria, both in the pulp-canal and the tissues about the apex of the root."

The cause of the disease known as pyorrhea alveolaris has not yet been determined. It is, however, generally agreed that pathogenic bacteria are always present in the disease. As a means of cure, very much has been claimed for the heroic surgical treatment as practiced by the late Dr. Riggs and others since his day. How the injury to the tissues resulting from this mode of treatment exerts a curative effect has been an enigma. May it not be naturally explained by the phagocytic action of the leucocytes, which crowd in when the fibrinous degree of inflammation following tissual injury is reached? The bacteria always present, both specific and non-specific, are devoured, and naturally the inflammatory process ends with the formation of new or cicatricial tissue. Then it is said we have a cure.

If pyorrhea is caused by a micro-organism and is an infectious disease, we have here an instance where the inflammation excited by a particular microbe becomes through the medium of leucocytes the cause of its own destruction.

We have been taught to place great reliance upon the so-called vital resisting power of the tissues. No doubt the living tissues exert a great influence in checking the development of bacteria in the diseased conditions I have mentioned, as well as in others we are called upon to treat; but it is only when we fully recognize the phagocytic action of the white blood-corpuscles that much which is obscure in treatment is rendered comprehensible. However, a belief in phagocytosis should not lead us to relax in the least the application of the most thorough antiseptic methods in our daily practice. The study of antiseptics and the intelligent use of antiseptic agents have done more than all else to cause dentistry to be classed among the arts preservative.

Antisepsis and phagocytosis, then, are both important factors in the treatment and cure of oral germ diseases, and should both alike receive our careful attention.

DISCUSSION.

Dr. M. L. Rhein: Dr. Patterson deserves much praise for the very interesting description he has given us of the various types of diseased conditions of the mucous membrane. He seems to have confined himself to cases that are purely local not only in appearance but also as regards their etiology. After listening carefully to what he had to say, it seemed that if the deductions were correct the cure of every case of pyorrhea alveolaris ought to be a very simple matter. It need only be necessary to diagnose the cause, remove the same, and effect a cure. Can this be done so readily? Many of us know from a long experience and many trials that there are types of the disease which may appear to yield to our skill temporarily, only to reappear with an alarming increase in the destructive effects produced. It seems to me as if Dr. Patterson had ignored these most destructive forms of this disorder, those which owe their origin entirely to constitutional disturbances. These are the types of the trouble which ought to engage our attention most seriously.

In such cases we generally notice at their inception, not, as just described to us, an increased activity of the circulation of the parts, but exactly the opposite state of affairs,—a decided stasis in the blood-supply surrounding the affected portion. If in these more serious cases there shall be present increased activity of the vascular system, the author's conclusions might hold as good as in the simple local forms of this disease of the mucous membrane so well described by him. If, however, there is present a decidedly diminished nutrient activity of the part due to the sapping of the vitality of some important organ of the body, the whole fabric of his argument (as far as it relates to this type of the disease) falls to the ground. That the disease knows no special clime for its home is well wrought out, a fact which also directly tends to show how frequently it may be found simply as a local manifestation of more serious trouble.

Dr. Smith, in his admirable paper, makes mention of the beneficial effects so often met with by following the heroic treatment inaugurated by the late Dr. Riggs. Why does this method of treatment so often bring such marvelous results? We know that in performing the operation of implantation the burring into the soft bony structure of the maxilla is followed by so much increased nutrient activity that we soon discover the implanted tooth to be very firmly fixed. When Dr. Riggs, by lacerating the tissues directly to the apices of the roots, obtained such marvelous results, it was due to the same cause. His

surgical interference in a part of the human economy where nutrition and consequent vitality were at a low ebb was followed, just as in implantation, by increased vascularity and the consequent nutrition for which the famished tissues were craving. It is unfortunate that we have not yet obtained a proper classification of these diseased conditions. The true secret of success for the practitioner, in all these cases, is to make a correct diagnosis before he attempts to do anything. Have we a due appreciation of the number of cases of alveolar abscesses that are confounded with pyorrhea alveolaris? It is still more difficult to diagnose those cases where the two diseases are closely blended. The pathological condition of the pulp of the tooth in many cases plays a much more important rôle than we can imagine from a perusal of our literature on the subject of pyorrhea alveolaris.

Dr. Barrett: The first paper now under discussion is of very great interest, but concerning it I have little to say, further than to congratulate the Association upon having an opportunity to listen to it. The second paper, which considers the so-called phagocytosis, introduces a principle which I desire to discuss. It has ever been a problem in physiology as to the office of the leucocytes of the blood; just what is their peculiar function in the human economy has not yet been determined. It seems extremely probable that the theory which was advanced by Metschnikoff, and which some of us heard strongly advocated in the Medical Congress at Berlin last summer, is true. Professor Lister read a paper in the Section of Surgery that astonished many who were acquainted with the views that he had previously advocated. In it he took occasion to recede from the ground which he had taken nine years before, and to declare that in his opinion an entirely aseptic condition could not be secured so long as there was a possibility of the existence of bacteria in the blood. We know that in an ordinary state of health one has almost entire immunity from most septic diseases; that unless there be direct inoculation the system seems to be proof against the invasion of pathogenic organisms. How is it that this can be the case? It can be accounted for only upon the theory that there is an inherent resisting power in some of the organs of the body. We know that as we sit here the spores of various pathogenic and non-pathogenic organisms are constantly floating about us, that we are breathing them in at every instant of time. How is it that we are not inoculated by them? Whenever pathogenic bacteria find a lodgment within the human system, why do they not produce their characteristic effects? The system must have some means of protection. It is extremely probable, although I do not believe that it is yet

entirely established as a scientific verity, that this safeguard exists in the leucocytes of the blood. These are amœboid bodies, and they have amœboid movements. It has been demonstrated that such simple organisms feed by merely enveloping that which forms their pabulum, which is then digested within the amœboid mass. Of course, the amœba has no special organs, but it simply wraps itself about a particle of food, and suddenly you find that it is within the mass. The jelly-like body seems to melt about it and the digestible substance passes in at any point.

The food of these unicellular organisms consists largely of the microscopical fungi. Sometimes bacilli—rod-like forms—have been observed projecting from each side of an amœba-like structure. The rod-like bacterium was longer than the diameter of the attacking organism, and so when it was enveloped in its body it projected at each side. When the central portion was digested a pseudopodia was extended, and the ends were in turn enveloped and digested. Then it seems that it is the office of protoplasmic organisms to destroy microscopical fungi by utilizing them for pabulum. The leucocytes of the blood are such protoplasmic, amœboid bodies. The spores of such microscopical fungi are the seeds of certain zymotic diseases. Why may it not be the case that the phenomena which have been observed in like bodies out of the system may take place within it? At any rate it is supposed that this is the action of the leucocytes of the blood, and that when the system is in a condition of atony they give it sufficient protection by destroying the fungi of disease.

Dr. Cravens: It is a pleasure to me to discover that the gentlemen are troubling to explain why immediate root-filling has been successful. It is also a pleasure to note that in doing so they tacitly admit that immediate root-filling has been successful. If success has attended immediate root-filling, it certainly requires no apology, phagocytosis or no phagocytosis ; and as elements of success in the practice of immediate root-filling, I presume that all who follow that practice will cordially welcome the phagocytes. Some gentlemen at first denied, almost viciously, the success of the practice of immediate root-filling, and now that they have discovered that practice to have been successful, they immediately try to take away from those who advocate and practice that method all the credit for success, and say that in spite of bad manipulation, through the assistance of the phagocytes, the practice of immediate root-filling has been successful.

Dr. George F. Waters: I was very much pleased to find that the author of the first paper agreed with me in his experience that all

diseased conditions arising from micro-organisms were preceded by a disturbed condition of the mucous membrane, and that disturbed condition he ascribed to certain other conditions. Now, if I can establish a first cause for these other conditions, he will accept my first cause for the disturbed condition in the mucous surface, and then it will follow that that first cause is the one for us to turn our attention to. When a child is born, the surface of the body is pink. It requires the presence of cold or a change in certain conditions of the atmosphere to bleach the skin. It quickly becomes paler, and in proportion to that paleness is the health of the child disturbed. So long as the skin remains pink and warm, the child continues to be healthy. When the skin bleaches out, then, you have the catarrhal symptoms, and liability to the presence of micro-organisms. If the child lives so as to be able to go to school, a glance of the eye of the master will sometimes cause the child to sweat. What does it mean? It means a contraction of the capillaries,—a disturbance of the circulation of the blood. What does that mean? It means arterial tension, and that the heart is working hard to give the child more nerve-force to withstand that aggression which has forced the watery parts of the blood through the skin. What are the disturbing causes,—the disturbing influences upon the skin, as we find them to-day? Mainly mental states, but not always. Atmospheric conditions have their influence, and throughout some parts of the country they are very potent. I find our east winds charged with the moisture of the ocean to have the greatest depressing influence upon the functions of the skin, and they cause the greatest contractions and disturbance in its action. And so I have come to this conclusion, that all diseased conditions may be epitomized as abnormalities in the circulation of the blood, or as results of such disturbance. What arises when we have this disturbance? What is the first thing? You have the pores closed. If the body remains warm with the closing of these pores, the temperature rises. What becomes of the carbonic acid that is generated? It is retained in the body, but not in the form of carbonic acid, for it unites at once with such alkalies as it may come in contact with. The first alkali it meets is that one which is associated with albumen in its work. In all nature soda is associated with albumen. When carbonic acid has united with soda, it passes from the body vicariously through the kidneys. When you get a lower condition of alkalinity in the blood, then you have a retrograde metamorphosis in all the albuminoids taking place, and they appear at the mucous surfaces as a disturbance. You have then the inflamed condition which the essayist speaks of in his paper, and not

until then. It may be local, as in coryza, or it may be in the kidneys, but if it is in the kidneys there is a disturbance in the skin near by, and the alkalies have been removed from that part, and the mucous surface of the kidneys is acting vicariously for the skin. No case of consumption ever existed that did not have for its inception a disturbance in the functions of the skin, or possibly, I might say, some external influence, which, acting on the lungs, reacted on the skin and produced the disturbance ; for the lungs themselves would soon take care of any disturbing cause if the skin remained true to its duty.

Dr. LeRoy : I would like to ask some gentleman in the room whether pyorrhea alveolaris affects devitalized teeth.

Dr. Rhein : I would reply that in the worst cases I have ever seen of so-called pyorrhea alveolaris, where the discharge of pus was constant, the pulps were dead.

Dr. Morgan : If pyorrhea occurs, just as far as the pericementum is destroyed, the vitality of the outer layers of the cementum is destroyed also. I do not know but all of the cementum loses its vitality when it is stripped of the pericementum by that process. It does not necessarily destroy the pulp of the tooth, and therefore the dentine and the enamel may retain their vitality until all of the vitality of the cementum is destroyed. Whenever the pulp is destroyed, it ultimately does that in many cases by producing alveolar abscess. If that occurs, of course the entire tooth, except the cementum that is still covered by the pericementum, loses its vitality.

Dr. Crawford : I doubt very seriously whether a genuine case of pyorrhea alveolaris has ever developed in the tissues in which the tooth is located, after the death of the pulp. I have made some observations on that line. I have not reduced them to proper order to be presented, but I am satisfied that a genuine case of pyorrhea alveolaris rarely occurs around a tooth in which the pulp has been devitalized previous to the primary lesion. I had some cases cited to me in opposition to this idea, but I have invariably found this condition to exist,—a suppurating sinus, an abscess at the root of the tooth. A case was presented to me in which the dentist had treated the tooth for incipient caries upon the anterior approximal surface and attempted to preserve the vitality of the tooth. From a large cavity involving the back surface and the grinding-surface the nerve became exposed and died. Failing to treat it properly, he had an abscess forming, burrowing down the root and opening about the bifurcation of the roots. My dental friend called it pyorrhea alveolaris.

Dr. Patterson : In closing the discussion, I could scarcely say

anything without repeating, as only one thing has been offered in contradistinction to anything that I have said. I will say first, in answer to the gentleman who first spoke, that I have never at any time doubted the consideration in which the constitutional environment must be taken in any disease of the mucous membrane. I did not give much attention to that in my paper, because that was not my point. My point was to direct attention to what was the incipient active cause in obscure irritations of mucous membrane, and which results in disease. I do not doubt the large factor in diseases of the mucous membrane which constitutional causes form, and they affect the progress of the disease just so far as they affect the condition of the system. Dr. Rhein was in error in interpreting my meaning in one remark he made. He said that I asserted there was increased nutrition after the function had been destroyed, and that I must be mistaken. There is increased nutrition near the beginning of all inflammations. It is nothing more, however, than one of the classic signs of inflammation marked by increase in the flow of blood. Afterward comes the stasis which he spoke about, the lessening of the nutrient quality of the parts, but at first, after there is irritation, whether from mechanical causes or loss of function, there is, after the first shock and stoppage of circulation, increased nutrition, but it is merely one of the usual signs of inflammation, quickly followed by the stasis and all the usual stages of inflammation.

Dr. Peirce: Dr. McKellops has called upon me to relate a circumstance which I mentioned to him. A week ago last Monday a practicing dentist in Philadelphia called upon me with his patient. He had in his hand the largest-sized rubber-dam clamp, and said his patient had that morning swallowed a clamp of that size and it was fast in the œsophagus, and what should he do? I told him to go to Dr. Cohen, about four doors above me. The day before I left the city I met Dr. Cohen in the street, and asked him what became of the patient. He said, "I took hold of the clamp with my forceps, but found I should so lacerate the œsophagus it would do the patient irreparable injury. I therefore told him to go home and live on mashed boiled and roasted potatoes for two days. Yesterday the patient brought me the clamp, having passed it through the alimentary canal so encased in the potato that it was in the shape of a ball, and so firmly was the potato attached to the clamp it could scarcely be removed from it."

SECTION VII.

Anatomy, Pathology, and Surgery.

A Plea for Conservatism.

Paper by W. C. Barrett, of the Section.

THERE are few men who possess minds so evenly balanced that they are enabled to view a subject from all the different standpoints, and, taking into consideration every factor that enters into the sum of the whole, deduce therefrom a fair and judicial estimate of the relative importance of each. One individual element assumes so close a relation to us that we see nothing else. A single angle presents itself to the vision, and gets so near as completely to shut out all view of other proportions, just as a finger's-end may be so close to the eye as to eclipse the whole world beside. This is especially true in all branches of medicine. There are such an infinite number of elements entering into the problem of pathological disturbances, each of which must in turn be taken up singly and carefully examined, that there is little wonder that every new agent presented should absorb attention for the time being, and monopolize a mind not sufficiently capacious to entertain more than one idea at a time. One single part of a great whole becomes so exaggerated by exclusive consideration that it engrosses the whole field, and everything else is lost to sight. Thus, one afflicted with some obscure disease may apply in succession to all the medical specialists, and in turn be told that the source of his illness is in the lungs, the throat, the stomach, the nerves, the genitalia, the eyes, or the teeth. And the opinion will in each case be an honest one, for constant contemplation of one organ, or set of organs, by the specialist has so exaggerated its importance that, remotely or immediately, each finds it connected with the physical aberration constituting his field of study.

When chemistry emerged from the dark ages of catalysis and spontaneous transmutation or change, and when was first observed

what should have been known at the outset, that every chemical transition was the direct result of a definite active cause; when man obtained his initial glimpse into that wonderful microscopic world which so greatly transcends the macroscopic in extent and interest; when he began to comprehend the molecular disturbances wrought through the proliferation of the vegetable fungi, and to get a little inkling of what was the true nature of those previously mysterious processes called fermentation and putrefaction, if he were the enthusiast that discoverers usually are, he imagined that the whole arcana of nature were now laid bare. Here was a new world of unknown vastness, and the influence of it upon the organic bodies of which its denizens were parasites was as yet unlimited by actual discovery, and imagination ran riot in the possibilities. These minute organisms might be the so-long-hidden cause of the unknown. Here might be found the key that would unlock the mysteries of nature. The cosmic egg was hatched. Microbes managed matter; bacteria dominated disease, and pathology was but another name for a ferment. Corns and consumption were alike due to some specific micro-organism. The whole duty of man, professionally, was to get at the microbe and to destroy him, and then hermetically to seal up the tissues against further infection. Everything else was lost to sight by many of the so-called progressive physicians, and septicism and antiseptics alone ruled the hour.

In medicine the errors into which an unrestrained enthusiasm led such great men as Koch and Lister, and even Pasteur himself, have brought about something of a reaction, and it has been learned that every other study cannot be abandoned for the bacteriological laboratory, great and important as that department is. In dentistry we are slowly approaching the same point. It was with difficulty that the great and sublime truths of which Miller first gave us a clear conception secured fair consideration. I well remember, and so will some of you, when in 1884, only seven years ago, this Association met in this very place, and when upon this floor I attempted to urge some of his views, I, with my friend Daboll, was fairly hooted down. We were howled at, and the wicked did gnash their teeth at us. Every time I opened my mouth one prominent member stopped it by hoarsely bawling, "I call the gentleman to order." But truth has made its way, and now the trouble is that the pendulum has swung to the opposite extremity, and upon this same floor I feel myself compelled to enter a protest against what has assumed the proportions of a craze. The microbe haunts us, and infinitely small though it be, it is

large enough to eclipse every other factor. We are now as obscure in the clouds as we were before in the caves. Climbing out of the cellar of ignorance, we have not stopped at the first floor of reason, but have rushed into the garret of fanaticism and zealotry.

Let me not be misapprehended. I am not underrating the importance of a thorough study of microscopical biology, nor would I for a moment depreciate the influence of microbes in oral pathological conditions. But I do deprecate the idea that there is nothing else to be considered, and that antiseptics and germicides are the only remedies which our pharmacopœias should contain. I protest against the assumption that because Miller, as the result of his scientific investigations, proves that there is no special remedy that will insure an entire aseptic condition of the oral cavity, and that tooth-decay cannot be entirely prevented, that therefore all the splendid results of his years of investigation are barren and useless.

In a late journal a dentist insists that nothing has been gained in the last decade, because teeth still need to be filled, and alveolar abscess yet occasionally occurs. Look back, you gentlemen who have kept pace with the onward march of progress,—look back and see what was the condition of dental pathological knowledge in 1881. Have we no reason to feel encouraged? Are we not now to a greater extent the masters of disease? Does not the dentist who carefully and discriminatingly uses the knowledge of to-day, adding to it the nice manipulation upon which the practitioner of ten years ago depended,—does he not succeed the better for it?

The great trouble is that many men cannot imbibe a single draught of knowledge without becoming craniologically intoxicated. A single large idea overstimulates their intelligence, and they lose mental balance. There is something more than mere metrical jingle in the famous stanza from Pope,—

> "A little learning is a dangerous thing ;
> Drink deep, or taste not the Pierian spring ;
> There shallow draughts intoxicate the brain,
> And drinking largely sobers us again."

Intelligent and enthusiastic dentists, who have the ear of the profession, have discoursed learnedly upon microbes and ferments, upon germicides and detergents, upon coagulants and non-coagulants, while the younger men who were perhaps taking their first sip of the fascinating draught, or at least with less of experience and knowledge, listened with open ears and wondering eyes. Nothing was said of other conditions than that of septicism, because the speaker took it

for granted that all were as well informed as himself, and that they would add the modifying provisions. A single factor seemed to be raised to a dominating position, and remedies new even to the chemist were specifically recommended, without a fair comprehension of their properties. Is it any wonder that in following such teaching mortifying failures resulted?

How long is it since immediate root-filling was a kind of craze, the result of just such enthusiastic but injudicious teaching? A new idea was allowed to run away with judgment. Theoretically, all that was necessary was depuration and sterilization. Young men ran off from the meetings, like newly-hatched chicks with half the shell upon their backs, and essayed the new practice until sad experience taught them that there were other elements to be considered, and that the dental millennium had not yet arrived. Some of them have sat in sackcloth and ashes ever since, giving dental societies a wide berth, and anathematizing these whom they believe to be false teachers, blind leaders of the blind, and all in the ditch together.

It seems to me time that we began to consider the subject of antiseptic dental treatment from a more rational stand-point. Microbes cannot be utterly excluded from the mouth. They will penetrate cavities of decay despite the greatest precautions. Absolute asepticism in any portion of the human economy is a dream that has no foundation in fact. At the International Medical Congress in London, in 1881, Sir Joseph Lister, who has given his name to a method of operative procedure, announced that the horrors of surgical interference were abolished, and that by means of the carbolic spray it was possible to operate under entirely aseptic conditions. But Ziegler, and Bantock, and Tait secured even greater success than did Lister, and they spurned his spray, being only sedulously careful as to cleanliness and irrigation. At the Congress held in Berlin last summer, we who had listened to Professor Lister with so much suppressed emotion only nine years before were astounded to hear him now say, "As regards the spray, I feel ashamed that I should ever have recommended it for the purpose of destroying the microbes of the air."

The practice recommended by some of our most intelligent dentists in the treatment of root-canals, it seems to me, looks toward the entire exclusion of microbes. Everything is managed with this end in view. The utmost stress is laid upon the most minute particulars, while other needed precautions are neglected. In cases of alveolar abscess we hear of nothing save detergents and antiseptics. It seems to be taken for granted that if microbes can be exterminated, nothing

else need be done. In the capping of exposed pulps asepticism is made the only condition of success.

I wish again to say that I am not urging indifference to antiseptic treatment. I believe it to be absolutely essential to successful practice. But I do not think that it is the sole factor, and the only thing to be looked after. I do not believe that the entire absence of all organisms can ever be assured. I do not hold it possible to secure complete aseptic conditions by any external means or agents. We cannot control the processes of nature; we can only influence them to a certain degree. We cannot, for instance, furnish the proximate principles of the body from without. We can only supply the proper pabulum, and from that allow the nutritive system to select and prepare its own material. The attempt to harden the bones or the teeth by giving phosphate of lime is a hopeless task, because it is not in accordance with physiological law, and it is quite as absurd to undertake the extermination from the tissues and organs of the body of all the micro-organisms, whether of a pathogenic or non-pathogenic nature. The oral cavity is never without microbes of various kinds.

The multiplication of remedies, and the duplication and reduplication of methods, will not compass the impossible. The more complicated the processes employed, the greater the opportunities for error. The absolute sterilization of dental instruments is impracticable. We may approximate it, but it is hopeless to attempt to destroy all spores without ruining the instrument. The germs of different fungi are too numerous and too widely diffused to be entirely eluded. Wherever air enters, there goes the possibility of infection, and air cannot be utterly excluded. Within the tissues, diffused throughout the blood, penetrating everywhere, the spores of the fungi are found, in health as well as in disease. There is no immunity from infection when an organ or a tissue shall have taken on a condition of atony. Man may fly to the uttermost parts of the earth, but there shall he meet with the destruction that wasteth at noonday. The microbe hath all lands for his own, and it is useless to attempt to escape his presence.

Does this absolve us from all attempts at asepticism? By no means. The very fact of the universality of the microbe should stimulate us to greater precautions. That instruments may not be made absolutely sterile, is no excuse for the almost universal and criminal neglect of proper precautions. How many operators keep a sterilizing apparatus and faithfully use it? It is of no material use merely to dip a point into some solution and then call it sterilized. How many have a special apparatus for the purpose? And yet no man should be per-

mitted to practice without something of the kind. While we cannot utterly banish micro-organisms, we have no right to be inoculating with specific pathogenic bacteria. I have seen many cases in which a previously healthy mouth became diseased after the filling of a tooth by some careless or ignorant dentist. I have under treatment now a very bad case of localized stomatitis, the result of the lack of proper and decent care on the part of a dentist. A beautiful and refined young lady was undoubtedly inoculated from unsterilized instruments that had been used in an affected mouth. We never know how susceptible an apparently healthy patient may be to infection by some pathogenic organism. Even animals, not domesticated, may have such a condition of atony as to subject them to the action of microbes from which it is usually supposed that they have immunity. I have the skull of an old male gorilla which had a very bad alveolar abscess, the result of caries of the teeth, and I have another skull of a female gorilla that suffered from undoubted pyorrhea. I also have a case of exaggerated antral abscess in a gorilla. You know that this animal has never yet been kept in a state of captivity.

In a condition of entire health nature has made provision for the destruction of invading bacteria. Whether the theories of Metschnikoff be true, and the peculiar power to digest and devour them rests in the leucocytes of the blood, or whether microbicidic action may be found in some other function, we cannot now positively say. But we do know that until the tone of the system be in some way depressed, there is immunity from the usual pathogenic organism. That the spores of different ferments vary in virulence is of course a fact, but that does not affect the truth of the principle.

A tooth that has lost its pulp cannot be said to be in a normal condition. Yet in the healthy mouth, if proper precautions have been taken and if the right mechanical measures for its protection shall have been employed, we know that it is secure against the attack of disease under ordinary circumstances. We know that in many instances a pulp has been destroyed in the most slovenly way imaginable, without any regard even for decent cleanliness, a filling has been inserted over the devitalized pulp without even an attempt to remove the contents of the root-canal, and it has remained in an apparently good condition for years. We know that until within a comparatively short time the roots of teeth were filled without antiseptic precautions, because the condition was not then comprehended, and yet they were sometimes well saved. Westcott, and Dwinelle, and their compeers filled nerve-canals before microbes and antiseptics were dreamed of,

and they did it with success, too. Antiseptic treatment is not then always an essential. But Westcott and Dwinelle were not able to save as large a number of cases, nor were they, with the incomplete comprehension of pathology which belonged to the fifth and sixth decades of the century, warranted in attempting the salvation of a class of teeth which, in the light of the further knowledge of this tenth decade, we do not hesitate to fill.

Thirty years ago there were very few who attempted the filling of root-canals, for the men who were able to make delicate manipulation take the place of pathological knowledge were limited in number. Now almost every dentist who reads the journals attempts root treatment, depending upon and following the methods laid down by those who pose as teachers. And it is just at this point that I desire to enter my protest against the half-teaching of the journals and societies when, affecting to discuss the whole of a given subject, only a single aspect of it is considered, and that is elevated into a matter of supreme, sole importance. I do not believe that it is sufficient that the cavity of decay should be deluged with detergents, saturated with germicides, and soaked with antiseptics. It is not enough that saliva should be excluded because of danger from infection. There are other reasons for it. The operation must be skillfully performed in yet another sense, and the manipulation must be perfect. The tissues about the tooth must not be injured by mangling blunders, any more than that they should be removed as far as possible from danger of septic infection. The filling should be judiciously chosen and properly inserted. The appropriate remedies to insure the restoration of the tissues should be employed. No use of germicides can atone for the lack of these and other manipulative measures. While septic conditions should be carefully looked after, even greater stress should be placed on hygienic and restorative measures, remembering that it is only in a state of comparative health that there is any security for the permanence of the aseptic condition.

I care little for coagulants or non-coagulants. Coagulation is certain in albumen when exposed to external agencies, and all the non-coagulants in the world cannot prevent it, except by its practical destruction. I care not to exclude all organisms, for I know that to be impossible. There are many which are not pathogenic in their character. It is idle to talk of danger from anaërobic, deep-seated organisms, for they are usually harmless, and if they were not they cannot be avoided. I care not that every instrument that enters the pulp-chamber shall have been heated to a red heat, which is the only

way completely to secure sterilization. We know that the material with which the root is filled is never made sterile, and if the manipulation is what it should be there is no necessity for it. We know that complete asepticism of the mouth is a hopeless dream, even if it were desirable. But we also know that cleanliness and dryness are essential, and we know that these are within the reach of every careful operator. We know, too, that comparative freedom from pathogenic microbes is readily attainable, and the dentist who does not secure this is unworthy the name. We know that a state of asepticism is not the only one upon which health of the tissues depends, and it is quite as inexcusable to neglect one necessary precaution as another. So I again protest against the tone of some of our modern teaching, that seems to ignore all that is not new and unheard of by the average dentist, and that affects only the obscure and the occult. I am willing to sacrifice my reputation for scholarship to that of good sense. I would rather have the approval of those who are really intelligent, than the applause of any number of groundlings. If I can be known as a safe, reliable, conservative, level-headed practitioner, I will resign all claims to daring, experimental, brilliant empiricism. I recognize the fact that it is necessary that there should be innovations and innovators, but I do not desire to be the patient of one. I honor those who by patient, laborious investigation elucidate the incontestable truths of science, but I cannot give my approbation to him who catches up the half of an idea, and by an absurd extravagance manages to taint even the best cause. Therefore, while I eagerly seize upon new truths, I try to prove all things, and especially to hold fast to that which is good.

SECTION VII.—Continued.

Pyoktanin Blue in the Treatment of Cancerous Growths, with One Case in Illustration.

Paper by JOHN S. MARSHALL, of the Section.

MR. PRESIDENT and Gentlemen: I desire to call your attention to the new antiseptic drug, pyoktanin, and its use in the treatment of cancerous growths.

Pyoktanin was discovered by Professor J. Stilling, of Strasburg, Germany. It is one of the aniline compounds and a powerful antiseptic.

There are two varieties of the drug, one of a yellow color and the other a deep blue; each produces a corresponding deep stain. The blue dye has greater antiseptic powers than the yellow, and is generally given the preference when the deep purple color imparted to the tissues by its use is not objectionable.

Professor Stilling and Dr. Wortmann, after making careful and elaborate chemical and bacteriological research, claim for pyoktanin as an antiseptic, that,—

"1. It has no injurious effects upon the human organism.

"2. It is absolutely destructive to all bacteria or other micro-organisms absorbing it, and

"3. It rapidly permeates and diffuses through both healthy and diseased tissues and fluids, and penetrates the enveloping membranes and internal matter of all bacterial colonies harbored by them."

For antiseptic purposes it is used in aqueous solution, the strength ranging from 1 in 1000 to 1 in 100, the parts being irrigated or painted with the solution. The only objection to its use by these methods is the discoloration imparted to the surrounding tissues and the staining of the clothing; these stains, however, are easily removed by washing in alcohol.

Dr. H. J. Bolt, of New York,* speaks very highly of pyoktanin blue as an antiseptic in connection with the treatment of various suppurative and purulent conditions coming under the notice of the gynecologist.

Dr. Roswell Park, of Buffalo, says, in "Annals of Surgery," that "pyoktanin cannot be relied upon in surgical practice except in such strength as to make it dangerous. In gonorrhœa it is disappointing. Upon granulating surfaces it exerts a desirable effect, but is no more valuable than other substances as easy of access, while the stain is often objectionable. In ophthalmological practice it has not come up to the requirements of the day. It has few qualities not possessed by numerous other drugs of its class, and on the whole it is disappointing."

For a few weeks I have been testing its value as an antiseptic in the treatment of phagedenic pericementitis, but I am not prepared to give the results of these experiments at this time, as it is my intention to present them to the profession in the form of a separate paper. This much, however, I may say in regard to it, that it gives promise of being a valuable addition to our yet very meager armamentarium for combating the effects of this disease.

The field, however, in which at present it seems to give the greatest promise of usefulness is in cases of cancerous growths of all varieties which have passed beyond the hope of successful removal with the cautery or the knife; by mitigating the sufferings and prolonging the life of unfortunate individuals who may be thus afflicted. Although no positive cures have yet been announced as resulting from its use, many have been greatly benefited, and some few have been so far improved as to hold out the *hope* of a positive cure.

In an article by Dr. Willy Meyer, of the German and New York Skin and Cancer Hospital, which appeared in the *Medical Record* of April 25, 1891, will be found a *résumé* of the opinions of the most eminent German surgeons upon its use and value in the treatment of cancerous growths, with the cases upon which it had been used, the results so far obtained, and histories of four cases treated by himself.

Let me quote a few paragraphs from this most interesting paper:

"Stilling mentions in his second paper that he succeeded in curing with pyoktanin an extensive exulcerated epithelioma of the face (ulcus rodens) which, beginning in the middle of the dorsum of the nose, involved the entire wall of the lachrymal sac and half of the upper eyelid. He first sterilized the surface with a large pyoktanin stick, and then powdered the pure substance on the formed eschar. This

* *Journal American Medical Association*, July 11, 1891, p. 76.

procedure was repeated a number of times. A hard cover was thus formed, which could not be pulled off. It came off by itself after a number of weeks, and underneath a smooth cicatrix presented itself. The eyelid, of course, was contracted. He states this case to show how effective the aniline dye can be even in such cases under special favorable circumstances, and not to claim to have found a remedy for cancer. In another case, which seemed to be much more favorable, this kind of application had no success whatever.

"On January 30, 1891, Professor v. Mosetig-Moorhoof read a very interesting paper before the Vienna Society of Physicians, 'A Contribution to the Treatment of Inoperable Malignant Growths,' in which he reported his experience with pyoktanin in such cases. In the treatise referred to, a number of cases are reported which demonstrate that in pyoktanin a remedy seems to have been found which possibly can bring help in cases of inoperable malignant growths, where formerly the patient and doctor seemed to be absolutely helpless."

Stilling was the first to suggest parenchymatous injections of aniline dyes in inoperable neoplasms, and advised the use of such dyes as will dissolve slowly in a 0.6 per cent. solution of chloride of sodium, viz: blood. He recommends this precaution to guard against the too rapid diffusion of the injected fluid through the tissues and the possibility of the dye entering the blood, as he feared that the absorption of too large a quantity by the red corpuscles might possibly destroy their function and thus endanger life. He is of the opinion that the blue dye is best for parenchymatous injection, as it is the most powerful antiseptic of this class of drugs and is soluble in only 0.7 to 0.8 part in 1000 of water.

With regard to its practical application to cancerous growths he suggests the employment of Von Nussbaum's method of treatment, which is to tie the principal arteries which supply the neoplasm to arrest its growth, and afterward to inject the tumor in all its parts with a solution of pyoktanin blue.

"Von Mosetig presented four of his cases, previously referred to, at a recent meeting of the Vienna Society of Physicians (March 13). The patients had all been materially improved, but were not yet cured. He is inclined to avoid injection into the tumors which involve large veins, and also into those which cannot easily be reached by the needle of the syringe. He now prefers a solution of 1 to 500 as a standard solution, which is filtered through heated asbestos to remove undissolved crystals, which might plug the needle, and makes the injections

in a concentric manner, letting his needle enter into the surrounding healthy tissues. Von Mosetig does not share Stilling's fear that too large an amount of the dye could enter the blood and thus do harm by staining the red blood-corpuscles. In several hundreds of these injections neither he nor his assistants have ever seen any untoward accident. Microscopical examination of extirpated pieces of three different new growths which had been injected—made by Riehl, of Vienna—demonstrated that the nerves, muscles, connective tissues, and young epithelial cells were diffusely dyed, but the nuclei only slightly or not at all. To explain this phenomenon, and at the same time the necrobiosis or fatty degeneration and resorption of the growths after the injections (which in his opinion can only take place if the cells and the cell-nuclei of the neoplasm themselves have really been affected by the pyoktanin), Von Mosetig advances the hypothesis that the pathological cells or their nuclei contain a specific chemical substance, which is able to reduce the aniline dyes in such a way that the latter lose their blue color; in other words, that this at present unknown substance reduces the blue aniline dyes to white,—that is, leukaniline. When the tumor has been extirpated and sections have been prepared from it for microscopical examination, the leukaniline in them, being exposed to the oxygen of the air, turns blue again.

"Billroth is rather skeptical in regard to the value of pyoktanin injections in cases of malignant growths. Three patients, having far-advanced sarcoma (posterior aspect of thigh, sternum, popliteal space), got worse; one of them died of sepsis. The tumors were softened and the covering skin was perforated. This occurrence can only be looked upon, according to Billroth, as unfortunate to the patient. The exulcerated growth troubles the patients much more and will render their condition more dangerous. Patients afflicted with exulcerated growths also did not improve. Billroth does not believe that pyoktanin, when injected, has any specific influence whatsoever, but that it is merely the water, which, forcibly pressed into the tissues, makes them swell and later unable to live. The researches are continued in his clinic."

Dr. Meyer reports having tested the value of the drug in nine cases at the hospitals and two cases in private practice. The histories only of the first four hospital cases are related in his paper.

It would be extremely interesting to review in detail the histories of these cases, did time and space permit; but it will be sufficient for our present purpose to say that the report shows that marked improvement followed the treatment in each case; the severity of the pain was

greatly mitigated, the diseased tissue took on a more healthy appearance, and in every case the tendency to spread to adjoining tissue seemed to be arrested.

In summing up his experience with pyoktanin, Dr. Meyer says,—

"In reviewing these four histories, and also considering my experience with pyoktanin as well as ethyl pyoktanin in my private patients, I should like to state the following facts in regard to the treatment of inoperable malignant growths with these aniline dyes, as far as they have been exhibited up to date (April 8).

"The aniline dyes, applied on the surface of exulcerated growths in ointment or powder (about 1 to 200), or in substance, have a strong analgesic effect.

"Parenchymatous injections of pyoktanin solution, 1 to 300, repeated every second day till the fifth day, the dose not exceeding one and one-half drachm, have in my cases proved to be innocuous to the general system.

"The symptoms following the injections are either general or local.

"The general symptoms, which can also follow the internal use of methyl-blue (as recommended for inoperable malignant neoplasms by Dr. Max Einhorn, of this city), are nausea or vomiting, weak and slow pulse, headaches, general malaise. These symptoms may come on the same day or the day following the injection; as a rule, they do not come at all; now and then there is a slight rise of temperature, usually subsiding within twenty-four to forty-eight hours.

"The local symptoms are:

"1. Pain following the injection. It may be of long or short duration, slight or severe. It is more severe where the cancerous infiltration affected by the injection is dense (epithelioma of face, disseminated cancer of breast, etc.). It seems that local anesthesia may follow the injection.

"2. Œdema, coming on either acutely, and then accompanied with slight redness (non-inflammatory) and pain on pressure, or rather in a sub-acute form. This serous transudation of the growth may be the first step to resorption. The slight fever, observed in a number of patients, soon following the injection had then to be looked at as being an aseptic one, possibly due to this resorption.

"3. Breaking down of the injected tissue, with perforation of the skin or scar, which latter is the result of the operation (aseptic necrosis). By using a stronger solution, 1 to 200, the necrobiosis seems to be more rapid in smaller nodules. It may be advisable to use a weaker solution, 1 to 500, instead of 1 to 300, as we can thus dye a larger

portion of the growth in one sitting, without increasing the dose of pyoktanin. We then inject a larger quantity of solution and still need not apprehend general symptoms. Perhaps the weaker solution will not destroy the tissue so rapidly, and thus rather induce resorption than necrosis. The sinus or sinuses established by the breaking down of the tissues give exit to a thick, dark-blue fluid, which, by microscopical examination, proves to be not colored pus, but débris of the injected neoplasm. It is generally intermingled with shreds of necrosed tissue. We also have to prove yet whether operative interference in this stage will really benefit our patients. Perhaps nature gets slowly rid of the necrosed tissue without help. As it seems, the carcinoma tends more to necrobiosis and perforation during this treatment than the sarcoma. I personally could, so far, only subject cancer cases to the color cure. (V. Mosetig had his most striking results in patients suffering from sarcoma [see above]. He maintains that the injections, made under antiseptic precautions, into neoplasms which are still covered by healthy skin produce necrobiosis and fatty degeneration, which is not followed by perforation, but by resorption. Billroth, on the other hand, saw rapid softening and perforation in two out of three patients who suffered from sarcoma and were treated with the injections.)

"4. Breaking down of the injected tissue (necrobiosis), with subsequent resorption (Cf. 3). This will probably be seen oftener if we stop the injections for some time as soon as spots in the growth have softened, and only start them again after those spots have shrunk, provided, of course, that they did not perforate. Small, hard nodules in the skin, as seen especially in the disseminated cancer (recurring cancer of breast), can entirely disappear in a very few days, even if the pyoktanin solution was injected into their base. Perhaps the rapid disappearance is not resorption, but only an illusion, which is caused by œdema of the immediate surrounding tissue. A number of the nodules reappear after a few weeks, sometimes rather multiplied. The attempt at dyeing these small nodules directly, by pushing the needle right into them, is frequently unsuccessful, even in regard to the microscopical appearance, and causes severe pain.

"An infiltration of hitherto healthy tissue with the neoplasm, in consequence of this treatment, has not been observed in a single case.

"In no case did the growth spread during the treatment.

"Applications of pyoktanin in substance on exulcerated tumors slowly remove the diseased tissue in the shape of dry gangrene. There is no suppuration under the eschar, on account of the strong antiseptic

qualities of the dye, and consequently no cachexia. Pyoktanin is, however, not a deodorizer. It is also not a styptic.

"It may be advisable to combine the parenchymatous injections and local application of pyoktanin with the administration of aniline dyes internally. Pyoktanin is, in my cases at least, not borne by the stomach. Methyl-blue seems at present to be the most preferable."

The reading of Dr. Meyer's paper greatly interested me from the surgical stand-point, for it so happened that just at that time a private patient, Mr. H., American, aged forty-one, general health good, family history good, referred to me by Professor Arthur B. Freeman, was suffering from a very extensive malignant neoplasm (small, round-cell sarcoma), originating in the antrum of Highmore, involving the right superior maxilla and malar bones, etc.

An operation, with the assistance of Professor Freeman, had been made for the removal of the growth in the antrum on April 2, 1891, but so rapid was the extension of the disease following this procedure that the second one, with the assistance of Professor John Owen, was performed on May 12 following, when the entire right superior maxilla, malar, palate, and turbinated bones, with portions of the sphenoid, were removed. The first manifestations of the disease were discovered only six weeks before the first operation. Ten days afterward, when the patient was allowed to leave the hospital for his home, there was forming over the right ramus of the inferior maxilla an extensive induration or infiltration.

It was determined, with the consent of the patient, that if there should be positive indications of further spreading of the disease or recurrence, we would immediately begin the use of pyoktanin by parenchymatous injection. I was led to this determination by the hope held out in the results which had followed its use in cases of a similar nature reported by Von Mosetig-Moorhof.

May 28, the induration over the right ramus had assumed the size and shape of a hen's egg, somewhat flattened laterally, and was unmistakably a further extension of the disease. Parenchymatous injections of a solution of pyoktanin, 1 to 500 in a 0.6 per cent. solution of sodium chloride in distilled water, were commenced at this date. Twenty minims were injected into the substance of the growth at four different points, five minims at each point. The utmost care was used to insure perfect aseptic conditions of the external surface of the tumor, the needles and syringe, the hands of the operator and the nurse, and in the preparation of the solution itself.

The following day the axillary temperature showed an elevation of one degree (at 9 A.M. it was 98.4°, at 2 P.M. it was 99.4°), which fell to normal in the evening. No other general symptoms were manifested.

May 31. Parenchymatous injection of pyoktanin, twenty-five minims at five different locations, five minims at each place. Temperature remained normal ; tumor larger, and feels very hard.

June 3. Injected thirty-five minims, divided between four locations, endeavoring to reach a new point at each time. No elevation of temperature ; tumor increasing in size.

June 6. Injected forty minims as before. Temperature normal, no unpleasant symptoms ; appetite good. Pain in the region of the temporo-maxillary articulation and sense of fullness following the injection. Skin over the tumor is tinged slightly purple. Tumor about the same size, perhaps a little larger, and very hard.

June 8. Injected forty minims, as before. Pain quite severe after the injection, evidently from the pressure of the solution ; this gradually subsided in half an hour. No abnormal temperature or other constitutional symptoms had been manifested.

June 10. Tumor seems to be somewhat smaller. Injected forty minims. Decided to double the intervals between the injections, as the tumor seems to be thoroughly dyed, and watch the results. Skin over tumor quite purple.

June 14. Tumor has been slowly but certainly decreasing in size since the last date, and has softened very considerably. Injected sixty minims, divided among six different points. Pain quite severe for a few minutes after the injection.

June 17. Slight redness at upper part of tumor ; looks as though the skin was about to rupture ; fluctuation quite perceptible at this point. Painted this location with collodion. Injected sixty minims in lower part of neoplasm, which caused considerable pain for a little time. Tumor slowly decreasing in size, most noticeable at upper part.

June 19. Tumor ruptured upon the inner side into the mouth, discharging a considerable quantity of dirty-looking purplish fluid, evidently necrotic broken-down tissue stained with pyoktanin. Tumor soft and much smaller. No injection.

June 21. No injection. Tumor soft and greatly reduced in size, and discharging same dirty-looking fluid. No evidence of suppuration.

June 26. Neoplasm still decreasing in size ; discharge has ceased. Patient feels so much better that he desires to return to business. Small point of coarse granulations near the anterior border of the velum palati. Injected thirty minims in this location.

July 1. Neoplasm has nearly disappeared, and the patient has gone back to his business. The coarse granulations referred to have disappeared; they were doubtless due to irritation from the packing used to close the cavity into the nose.

July 13. Patient reported to-day for examination. Neoplasm has entirely disappeared. Discovered another point of coarse granular-looking tissue at the bottom of the cavity; applied pyoktanin 1 to 300 of lanoline upon a piece of absorbent cotton held in place by the packing above referred to.

July 16. The coarse granular tissue at bottom of cavity has disappeared. Patient cautioned not to irritate the surface of the cavity by undue pressure of the packing, and instructed to report at once if at any time there should be evidence of recurrence.

Remarks.—In the exhibition of the drug in this case, I endeavored to profit by the experience contained in the published reports of others. From the fact that in all the cases reported by Dr. Meyer the drug was not borne well by the stomach, I refrained from administering it in this manner; and as there was no external ulcerated surface, the use of stick or powdered pyoktanin was not indicated. I chose the 1 to 500 in 0.6 per cent. sodium chloride solution as being the safer strength, beginning the injections with twenty minims and gradually increasing them to one drachm for the same reason. The possibility of septic infection was guarded against by strict antiseptic precautions, and the needle wounds were covered each time with collodion.

From the beginning to the end of the treatment there has not been the slightest evidence of constitutional disturbance from the use of the drug, save the elevation of one degree of temperature, which occurred on the day following the first injection, and which I am quite inclined to believe was the result of anxiety as to the outcome of the treatment, rather than to the influence of the drug. Pyoktanin in this case has certainly proved very beneficial, and gives promise of establishing a complete cure. Time only will demonstrate whether this promise is to be fully realized.

One thought further: The impression has been gradually growing in the minds of not a few noted surgeons both of Europe and America that the clinical facts surrounding the location and progress of primary carcinoma and possibly sarcoma in all their forms would indicate an entirely local origin of these neoplasms, and that they might be caused by the lodgment or ingress of a specific micro-organism, entering through abraded surfaces and wounds. I therefore ask, May not the results so far obtained in the use of this power-

ful but innocuous antiseptic drug, pyoktanin, upon malignant neoplasms, be a further indication that this may be the correct theory of the origin of these growths, and the line upon which further experimentation will give the greatest hope of success?

If pyoktanin does not prove to be permanently efficacious, may we not hope that through the combined efforts of the chemist and the bacteriologist some other drug will yet be discovered that will eventually conquer this dreadful and loathsome scourge of humanity?

DISCUSSION.

Dr. George F. Waters: With reference to relief of cancer, I chanced to meet with a case accompanied by an offensive odor in a man over eighty years old. I asked him if he was under treatment of a physician. He said he had been, but he had no treatment now, because nobody had succeeded in helping him. I told him I could relieve him of the odor. I invited him to my office, and took some of the matter between two slides of glass and inclosed them to Dr. Day, of Boston, by the hand of Lincoln R. Stone, M.D. I received a report next day saying that the matter was undoubtedly from epithelial cancer. I did not give him any history of the case. I treated the cancer by introducing into the opening, which was big enough for my thumb to enter, a few crystals of Calvert's carbolic acid, moving them around with a pledget of cotton so as to bring them in contact with the indurated surface. The odor at once disappeared, but there was considerable pain. I made an application over the surface with bibulous paper in such a way as to catch whatever discharge there might be from the cancer, and he went away. The next day there was not so much discharge as there had been, and no odor, while the opening seemed to be larger, and the indurated surface did not rise so high above the surrounding tissue. I continued the treatment, and sent some more of the fluid discharge to Dr. Day. The next time he reported that it came from bone cancer. The cancer was not, however, in contact with the bone, nor was the bone exposed, but was mainly in the skin. In three weeks' time the whole of the induration had disappeared, and there was not an opening as large as a small pinhead. The man came in the next day, however, with his face looking worse than I had seen it at any time. I asked him what it meant; he said, in breaking some oven wood, one of the boards flew and struck him in the cheek with the jagged end. I had to begin the treatment over again. Suffice it to say that the whole surface eventually healed *under the treatment of carbolic acid*, leaving *no discoloration of the skin, nor any scar.*

I believe that cancer nevers occurs except when the body is in a low stage of supply of certain essential elements, and the element which I often miss is soda. In those cases you find the skin indurated, the arterial tension great, the albuminoids in a condition to furnish food for bacteria, and the system generally in a condition for any disease of the mucous surface or of the skin to be readily set up.

DR. TRUMAN: I do not propose to take up the time in the discussion of cancer, important as that may be, but under Section V. I prepared something in regard to pyoktanin as one of the agents that has come into use during the past year; but inasmuch as Professor Marshall considered the matter very fully in his paper, I concluded not to read it, and will only make some brief remarks in regard to this agent. Pyoktanin, as you know, was discovered or introduced by Professor Stilling, of Strasburg University, and he gave it that name with the idea that it was a pus-killer, from two Greek words meaning pus and death. It is a derivative from coal-tar, and those of you who have not seen the preparation can examine it here on the table, both the yellow and the blue. Pyoktanin may be an excellent agent for the purpose of destroying bacteria in general surgery, where its penetrating power may give it great advantage, but when used as an antiseptic in dental practice its property of deep penetration and coloration becomes a bar to its use. It will be found impossible to prevent its entering the tubuli of the dentine and producing permanent discoloration. It can be made in solution of one thousand of water and one part of the agent, or in surgery it is used as high as one to ten thousand. I think the praise bestowed upon this agent by our lamented friend Dr. Atkinson was overdrawn. I do not regard it as of any more value than the ordinary derivatives from coal-tar, as naphthaline, hydro-naphthol, or resorcine. All those agents are valuable, and I think more valuable than most of the germicides in use, but the coloring power of this preparation will always be, in my judgment, an argument against its use in dental practice. That is the substance of what I wished to say in my paper, and I leave the matter here with those who wish to experiment with it.

DR. G. J. FRIEDRICHS: I should like to know of Dr. Marshall whether some other agent, for instance carbolic acid, would not have answered the same purpose. It is well known that neoplasms sometimes are so exuberant in their growth that when the nourishment ceases it is insufficient to supply the demand for further development; they soften up and slough off, and in that manner cure themselves. As an illustration of how a person can be deceived, Dr. Suchon, of the Charity

Hospital in New Orleans, was treating a tumor for over six months without success. The tumor was in the lower jaw, and was about the size of a large walnut. The patient had a number of old roots in his mouth, and consulted my son, who was of the opinion that if the roots were extracted that would end the matter. The roots were extracted, but the tumor remained for some time, till Dr. Suchon injected carbolic acid, when it disappeared, and the case was cured. I think there was infiltration and that the roots had something to do with it, although the injection of carbolic acid may have aided the matter, because it acted as an irritant. Besides, you know that one swallow does not make a summer. This one case would not prove that pyoktanin was a cure for cancer.

SECTION VII.—Continued.

Fracture of the Lower Maxilla by a Gunshot Wound. Treatment by an Interdental Splint Bridge.

Paper by J. D. PATTERSON, of the Section.

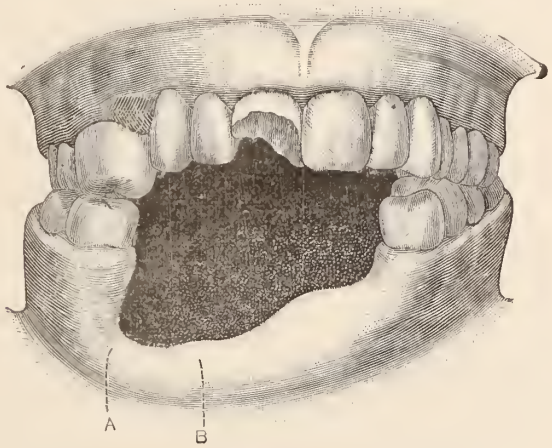
THE patient, Quartermaster-sergeant Charles Campbell, of the Seventh United States Cavalry, in the battle with the Indians at Wounded Knee, near the Pine Ridge Agency, was struck on the lower maxilla with a ball (from a Winchester rifle, presumably), and the anterior part of the maxilla from the second bicuspid upon the right to the second molar upon the left side shattered. Shortly after the fight, such surgical care as was possible was given the case. The loose teeth and parts of the alveolar process and bone below which were entirely loose were removed, and the wound in the lips and cheek stitched together. It was thought possible at first that there might be union between the remaining partially-detached fragments, but gradually piece after piece came away, until at a point in the region of the right cuspid for the space of about six lines the bone (Fig. 1, A, B) was entirely gone, leaving the remaining posterior parts freely movable.

Six weeks after the injury the patient was brought to me presenting the following condition: The outside wounds had healed with considerable cicatricial tissue; the left fragment of the maxilla was easily movable, and an abscess was discharging freely upon the face opposite the loose end, with another abscess opening under the chin near the symphysis; the left side of the jaw was much firmer than the right, but had healed far inside—about a half-inch—from the normal position. There was still considerable swelling, and small spiculæ of bone frequently made their way to the surface. The lower jaw was of course entirely useless, and was kept tightly bandaged to the upper.

The first treatment instituted was as follows: I found that a bridge-

splint placed upon the parts as presented would result in retaining the incorrect position of the left side, and that pressure brought to bear to force the pieces apart would result in still greater deformity, because the more easily movable right fragment would give way, leaving the left in its former position. The first step then was (if possible) to remedy the distorted position of the left side. I proceeded as follows: I banded the first lower molar upon the right side and also the first upper molar upon the same side, attaching lugs to the bands for the reception of a screw, and firmly screwed them together. I then placed a jack-screw upon these molars on the palatal side and against the molar on the left side, and forced that side into its correct

FIG. 1.



position, which had been determined by models beforehand. I then banded the upper and lower teeth upon this side as upon the other, and screwed them firmly together.

I then dismissed the patient for ten weeks, the intention being to overcome the growth of cicatricial tissue which forced the left side against the tongue. I believed the abscesses were caused by the movement of the loose ends upon the soft tissue, and the result proved that this surmise was correct, as they soon healed after the parts were secured firmly to the upper jaw.

At the end of three months the patient returned. He reported himself as very comfortable, save only that he was limited entirely to soft foods. On the removal of the bands the left side, after two or three days, swerved slightly inward and there remained, not quite, but nearly in correct position. I then proceeded to make the splint-

bridge shown in the cut (Fig. 2). No details are necessary in describing this to any experienced bridge-workman. It is a splint as well as bridge. In restoring the contour of the lower lip and lost portion of jaw, rubber is vulcanized to the bridge. It has been worn for six months, and the patient, whom I saw four weeks ago, says he is a new man, and his appearance holds the statement true. He eats solid foods with comfort, and the splint-bridge is a success. I am watching the case as to the growth of new bone where it is entirely gone. He is a young man in good health, and the chances for this are good.

In conclusion, I take great pleasure in bringing this rare case before you, because it shows how the dental profession can supplement the best that the surgeon can do, and gain a result which makes life to this patient once more a pleasure.

FIG. 2.

The surgeon at Fort Riley, Captain Hoff, had care of the outside wounds on the lip, and succeeded admirably in preventing permanent disfigurement. I am indebted to him for intelligent assistance in after-care of the case.

DISCUSSION.

DR. CARROLL: This is a particularly interesting case to me, being quite analogous to a case of my own. In November, 1863, an Irishman named John Bergen received a wound from a musket-ball which entered the left inferior maxilla between the second bicuspid and molar, producing several fractures, carrying out a portion of the maxilla with the first and second molars and second bicuspid on the right side, leaving the third molar intact. Where it entered it carried under the tongue that portion of the jaw between the second bicuspid and the ramus. He came to me in the month of February following. The left incisor had slipped past the incisor on the right side, and they lay one in front of the other, and he could not speak. I dissected the portion under the tongue and loosened the tongue. That gave me the segment of the jaw in position. I got a single impression in very soft wax of each of the

segments. I then secured an impression of the upper jaw to give an occlusion to the lower fractured jaw, to which I fitted a rubber splint. At each fracture there was a fistulous opening from necrosed bone. I did what I would have done in the case of cancer that was reported this morning : I resorted not to pyoktanin, but to aromatic sulphuric acid, and the suppuration stopped in forty-eight hours. That is the treatment I followed, until not only there was union of all the fractures, but an entire reproduction of the maxilla the distance of two molars and one bicuspid. It was a very interesting process of granulation. It took about four months to complete the reproduction, which up to that time it was alleged could not be done, because we had no periosteum covering it.

Dr. Marshall : I want to compliment Dr. Patterson on the way in which he managed this case. He said that he was watching very anxiously to see whether he would get reproduction of bone. I think the chances are against that, though it may come ; but it occurred to me if he did not get reproduction of osseous tissue, it was a beautiful case for transplantation of bone. I have had a little experience with this latter operation,and have been successful in one case and unsuccessful in another. In this case the space is so narrow that I believe it might be united by transplanting bone in this manner,—laying open the tissues, externally, and paring the ends of the bone, and then from a young rabbit about half-grown or other suitable small animal taking pieces of the bone with the periosteum attached, as thin as they could be cut, a line to a line and a half in length, and laying them in rows until the space is filled, and closing the tissues. The operation should be done antiseptically and without drainage. If you did this inside of the mouth it would prove a failure, because you could not keep the wound aseptic. In the case I speak of I grafted twelve pieces of bone put in by this method, and not one failed to unite.

Dr. Horton : Some two or three years ago a man about forty years old, of strong build, and apparently in full vigor and perfect health, filled himself with whiskey, and in trying to pass over a trestle-bridge of one of the railroads in our city fell about forty-five feet to the track of another railroad and fractured his lower jaw in three places, viz : between the second and third molars on the left side, the first and second, or central and lateral, incisors on the left side, and the first and second molars on the right side (as I now remember), making five pieces.

He was taken to a hospital, and I was sent for by the surgeon and requested to take my engine with suitable drills to perforate the jaw,

that the parts might be held in place with wires. On examination I found there was no lesion on the inside of the jaw, the tissue being undisturbed. I therefore advised against perforating the jaw, but that the parts be put in coaptation and the lower part of the face be incased in a plaster of Paris splint. This was done, and in a few weeks the man was dismissed cured.

Dr. Patterson : One word in regard to the advisability of transplantation of bone. I never should advise it in this case, from one fact alone, that the jaw upon the right side that remains has been so badly used up, many splinters clear to the ramus being gone, that I do not believe it would be successful. There would be a risk also of breaking up the comfortable condition of the patient to-day. This matter was discussed by the surgeons, but it was stopped at once by the sergeant himself, who said he was comfortable.

SECTION VII.—Continued.

NEW OPERATION FOR CLOSURE OF CLEFT PALATE.

Remarks by TRUMAN W. BROPHY, Chairman of the Section.

It is well known that cases of cleft of the hard and of the soft palate are usually accompanied with harelip, single or double. In many cases of double harelip we have extremely broad clefts of the hard palate. Usually the surgical procedure is to close the tissues of the lip and permit the cleft of the palate to remain unclosed, to be corrected later in life. This, in my opinion, is a mistake. I have held these views for some time, and in the last two or three years I have been attempting to make a radical operation for the closure of the hard palate. The closure of the soft palate has long been a perfectly well-known operation, and in some cases the hard palate has also been closed by surgical procedure. The time best adapted for the closure of the hard palate is in early infancy, from the first to the third or fifth week after birth, and it may be done by the proceeding which I shall describe. By the kindness of my friend, Dr. Jackson, we have on the board a sketch, so that I may more clearly show the mode of operation that I am about to detail.

This operation should be performed as soon as the organs of the body are performing their functions normally. Ordinarily very young children suffering from this deformity are extremely weak, and not able to submit to an operation. In this event time should be allowed in which to gain strength. This drawing illustrates, as you see, the palatal aspect of the superior maxillary bones. This line represents the line of separation between the inter-maxillary bones and the maxillary bones proper. This suture fails to close in case of a single harelip. To close the broad cleft of the hard palate and to secure an adaptation of the parts of the opposite side, we must resort to something more than external pressure. I am aware that Dr. Sayre, of New York, has operated by the use of the external apparatus with which to exert pressure upon the sides of the face. In early infancy the bones are so soft and flexible that they may be easily bent, and in narrow clefts the edges may be approximated, but in a broad

cleft like this illustrated on the board it is absolutely impossible, by the force or pressure upon the cheeks, to get the edges in proximity to each other. Having pared the edges well, and removed not only the mucous membrane, but a layer of the bone, we then lift the cheeks, —there is an advantage to be derived in operating on the palate first, inasmuch as the large space in the lip gives us a great deal more room in which to operate,—introducing a drill, carrying it through the substance of the maxillary bone, so that it will pass through above the palatal plate, then beginning with the drill on the opposite side, carrying it through, so that we will have a small opening through from side to side. We then carry the cheek well back, and pass the drill through in the same manner, so that it will pass above the palatal plate of the bone. Having done this we introduce a wire of good size and sufficient strength to serve our purpose through the openings we have made, and through the substance of the bone anteriorly and posteriorly. Having done this we make use of a lead button, as illustrated by this drawing. This is perforated so that we may lay it upon the sides of the bone, as shown here, this representing the buccal surface of the jaw. Introduce the wire through one of these openings. Now we set those wires up by twisting them together. We find that we do not exert sufficient pressure to bring the parts into contact, therefore we raise the cheeks high up, and with the knife we divide the mucous membrane just below the orbit, and divide the bone so as to separate it absolutely from the tissues above. This is done upon either side. Having separated the maxillary bones from the tissues above, we have no trouble in twisting our wires and setting them up, and thus bringing the edges of the cleft bones in contact. By so doing we secure a perfect adaptation of the parts. The process of repair will go on, and we will get union of the bones on either side.

The question may be raised, what would be the effect upon germs of the undeveloped teeth? That I do not know. I have one case far enough advanced so that I think we can soon see what the effect will be. But it makes very little difference, even though the germs of several teeth are destroyed. What is that in comparison to the value of being relieved from that deformity, that most troublesome difficulty of defective articulation which so characterizes these cases of cleft of the hard and the soft palate? Everything is in favor of the operation in early infancy. The parts are more easily manipulated, they more kindly unite, the operation can be made with less shock to the patient, inasmuch as the nervous system of the child is not so highly developed at that age as later. Besides, the child is,

after the operation, better nourished. Another matter of great importance is, when the child comes to an age that he may articulate, his articulation is correct, and he lives and moves and has his existence without being embarrassed through life with the deformity which characterizes cleft of the hard and soft palates.

I would like to have written on this subject and described more in detail my operation, and dwelt briefly on the etiology of cleft of the hard palate, but the Section has already occupied a great deal of time, and we have a great deal of matter to present hereafter, and I will close with what I have said.

DISCUSSION.

Dr. Marshall: I would like to ask Dr. Brophy wherein he claims that this operation is any better than that known as the subperiosteal operation. It certainly is a much more serious one. He made the statement just now that the nervous system of a young child is not so highly organized as later in life. The fact is, and it is recognized by all physiologists and by practitioners of medicine and surgery, that shock to a little child is much greater than to an older individual from the same operation, due to excessive nervous irritability. Serious operations are never recommended to be performed upon little children. They are usually put off until after first dentition for the same reason. It seems to me in a case of that kind such an extensive operation had better be postponed until after first dentition is completed, and then make the old operation, simply dividing the mucous membrane about midway between the edge of the cleft and the inner aspect of the teeth on both sides, not attempting to draw the bone together, pare the edges, lifting the periosteum and the mucous membrane from the bone, and suturing them together on the median line. In a great many cases there will be formation of new bone and the whole cleft filled up. That operation is much less serious than the one Dr. Brophy has indicated. I should expect an operation such as he has described made upon a little child of that age would be almost certain death. There might be cases in which the child would survive. I think if he keeps a record of his cases he will find that the fatality will be very great. Another mode, or operation, would be to drill and split the bone midway between the edge of the cleft and alveolar process, and suture on the median line. It would be less of a shock to the child than would be this operation which Dr. Brophy has described. For my part I cannot see how that is an improvement over the old methods.

Dr. Cravens: Dr. Brophy suggests the possibility of injuring the developing teeth in operating upon a subject of the age of three weeks. The crowns of the deciduous teeth at that age are already formed, and the formation of the adult crowns has progressed so far that, I think, for such an operation to stop the growth of the teeth the surgeon would have to begin a good deal earlier than three weeks after birth.

Dr. Patterson: I had thought it well settled in the dental profession that the operation for congenital cleft of the hard and soft palate has been for many years discouraged, for the reason that what we aim to get, the perfection of articulation, is never accomplished by that operation on account of the lack of soft tissue. It is thus impossible to close the opening between the mouth and the nose, which is necessary to perfect articulation. The operation does not increase the volume of soft tissue which is lacking. If it does not, articulation is not improved. The benefit in articulation obtained by a perfect surgical closure of the opening of the hard and soft palate while the shortness of the soft tissue remains is almost undistinguishable. Better in every way is the artificial obturator or soft velum.

Dr. Volck: I have in forty-one years of my practice operated upon a great number of harelips. In fact, at one time I made that a specialty, and I have operated upon hard palates of adults in the endeavor to close them. I think the bringing together of the hard palate in children in earlier life is a very serious operation, and I have witnessed two deaths from that treatment which I attributed entirely to nervous shock. In the later operations which I performed I have simply brought the forward part of the maxillary together, paring it so that it would have a good form, and at the same time prevent that very unpleasant opening into the forward part of the nose which is so often the consequence of that operation. The operation on the soft palate is usually successful, so far as the articulation is concerned, as the curtain accommodates itself as the child grows, and the articulation in most cases is perfect. I do not give this as a matter of speculation, but as a matter of positive experience. So far as the operation on the hard palate is concerned, I think the doctor's idea is extremely ingenious, but I doubt much whether any child would survive it.

Dr. Marshall: With regard to the closure of the soft palate, the statement has been made that it is never successful, so far as speech is concerned. I have made a good many of these operations, and I say positively that if properly performed, and there is a sufficient amount of soft tissue,—you cannot make soft tissue,—the operation is a success.

I will give you an illustration of one case, and a remarkable one, of an Irish woman, forty-nine years old, who came to this country nine years ago for the express purpose of having an artificial velum made. She went to Boston and was in the hands of one of the very best mechanical dentists there, who made her an artificial palate. After wearing it three or four years she said she could see no change in her speech, and she finally drifted to Chicago. I conversed with her and tried to understand what she said, but could not until she wrote it out. I told her to take out her artificial velum and let me hear her talk without it. She did so, and I could distinguish no difference. I told her I thought she could be helped by an operation,—that there was soft tissue enough to make a good curtain. There was a complete cleft through hard and soft palates. She said she would submit to anything I recommended. I told her I could put her mouth in as good condition for speech and taking food as it was then, and she could throw her plate away. She consented to it, and if I had her here to-day you would have no difficulty in understanding every word she said. It was a success. She does not talk perfectly, however, as that could not be expected. This is the way I performed the operation. I supposed at the time it was original, but I found out afterwards in looking over the books it had been recommended fifty years ago. I operated by what is known as the subperiosteal method, and when that was completed I simply took my bistoury and cut through the soft palate on each side so as to loosen it thoroughly from its attachments at the sides. The result is that when she attempts to swallow liquids she can do so without regurgitation into the nose. The woman is able to speak so that you can understand her, and I say it is a much better result than that obtained by the artificial piece.

Dr. Volck : In operations upon the soft palate of children, the separating of the soft palate from the maxillary bone on either side is absolutely necessary. My way of operating is this. To bring the edges entirely together is almost an impossibility, but by separating the velum slightly from the bone from the inside and splitting it, not entirely through, you can draw the flaps together in almost every instance.

Dr. Brophy : I am highly pleased with this discussion, because it has brought out some features of the operation that I could not for want of time touch upon, and which I shall be pleased to answer. The remarks made by Dr. Marshall as to shock caused by operations upon young children I do not think well established by our knowledge of physiology. The works on physiology of our best authors

show us that the young child is not so susceptible to nervous shock as one further advanced in life.

Our best knowledge of surgical operations is that based upon clinical experience. I had seventeen cases of staphylorraphy in about five years, three of which were this operation, and in not a single instance has there been any marked inflammation following the operation. The child has apparently been as well nourished and has seemed to thrive as well as any other child. In verification of this I can exhibit patients upon whom I have operated.

The statement made by Dr. Patterson is one that I should possibly have made myself in presenting the case, but for want of time I did not enter into all the details. The question is as to the lack of sufficient soft tissue. It is a fact, and it cannot be successfully contradicted, that the child having cleft of the palate has, at birth, in nearly all instances, as much tissue forming the soft palate as any child that has a perfect palate. The only difference is that the surfaces of the soft palate are not united. What is the result of this non-union? If the child is permitted to remain as he is, these soft tissues are not put to use. It is not necessary for me to state the need of making use of all the parts of the body to keep the body up and in a vigorous condition. The right arm of the blacksmith measures more than the left, because of its use. It is a fact that if the soft palate be closed in the young child it will develop, and there will be sufficient tissue to close the posterior nares and thus secure perfect articulation. The reason why many of these operations on the soft palate fail is that the tissues are not properly brought together and not properly secured. The tissues must be brought together and retained in quiet contact. When the surfaces are approximated they must be held together, and not allowed to slide back and forth during the act of speaking or crying, or whatever may occur in the use of the voice. That is where the mistake lies. Tissues cannot unite unless they are kept in quiet contact. If the tissues are not united, if the soft palate of a child is permitted to grow without union, there is an atrophy of the parts for want of use, which is why the operations later in life have been a failure. It is absolutely necessary that there be sufficient tissue to close the posterior nares, so as to secure perfect articulation. Later in life it cannot, with some exceptions, be done, because the tissue is atrophied. I am quite well satisfied that many patients are wearing artificial palates, who, had they been operated upon in early life, would never have known the inconvenience of this mechanical contrivance, which is a kind of nightmare to them all

through life. It is one of the most depressing things to be obliged to be tied down to some mechanical contrivance in order to get along through life.

Dr. Patterson : At what age would you recommend the operation ?

Dr. Brophy : Some gentlemen have said we should wait until the teeth are erupted. Do not accept those statements, or put them in your note-books and practice them, until you have given this matter careful consideration. What is the effect of waiting until the teeth are erupted before operating? The articulation is established, and you cannot make an operation here, bringing the entire maxillary bones together, without destroying that articulation or antagonism of the teeth. This operation when made early in infancy does not affect the articulation of the teeth to any very great extent. If the arch should be somewhat contracted, by means well known to every dentist of the present time it may be easily expanded. This operation I have performed a great many times by cutting the hard palate and bringing it over, but I regard it as very inferior. I regard it as an operation that almost invariably produces more shock than the early operation. Later in life we have dense tissues, highly organized, with blood-vessels and nerves. We break through the tissues and tear loose the nerves, and produce a shock that would not be produced by carrying the soft parts together when they are almost in a gelatinous form.

SECTION I.

Prosthetic Dentistry, Chemistry, and Metallurgy.

Hydrogen Peroxide per se.

Paper by D. R. STUBBLEFIELD, of the Section.

THE name of W. H. Atkinson has gone into history. Though dead, he yet lives in our memory of his life and excellent character. Your essayist considers him one of the few men he has known whose life bears the stamp of immortality. If his power of imparting had been commensurate with his wonderful power of perception, then would his day and generation have been blessed by him as by no single other man. The realm of ideality seemed to be the field of his best achievements, yet because his fellows were often unable to mount with him into that higher world, he did not always transmit happily and certainly those fine impressions that fired his soul almost to the point of prophecy. The result was that frequently it was thought he had dwelt among his dreams until they had fixed upon him their spiritual incomprehensibility. But the prediction is here hazarded, that with the lapse of time and the advancement of science there will come a day when what he had to say will be considered almost as a message from the gods. He was completely in advance of the time in which he lived, and when the world has reached his point of view, it will no longer question the validity of his dreams nor the correctness of his predictions.

But this occasion has not been taken advantage of for eulogizing him so worthy of eulogy. It will now appear that he was incidentally the remote cause of this article. On one occasion he was heard to state that science was not upheld nor advanced by *guesses* pure and simple.

This assertion is so forcible and self-assertive that it would be a work of supererogation to uphold it. Fortunate accidents have undoubtedly contributed to our scientific lore, but these accidents have usually come like a flash of inspiration when the pulsating intelligence of some child of genius has stirred the pool of speculation. An accident that amounts to anything of worth has antecedents that have almost rent the veil that held, yet hid, the living thought.

It may, doubtless, be recalled by some present that last year at Excelsior Springs Professor Peirce, of Philadelphia, presented a tooth which had been subjected by him to the action of hydrogen peroxide. The phenomena that had puzzled him were threefold, and he asked an explanation. First, when the H_2O_2 was fresh, it would apparently attack the tooth, and after a while this excitement would cease. Secondly, he noticed a white and rather flocculent-looking mass settling to the bottom, which seemed to increase after each addition of fresh H_2O_2. Thirdly, it was his opinion that the tooth was not eroded and roughened by this seeming attack upon it.

This threefold specification about covers the field of his speculation and the phenomena he observed. Without recalling the discussion, suffice it to say, that your essayist was betrayed into making a *guess* as to the active agent in the case. With good authority at the time present in the meeting backing him, and with the knowledge that hydrogen peroxide was made by the action of barium dioxide upon hydrochloric acid, he guessed that the active component present was the excess of that acid. There was no time nor opportunity to again call up the subject, and he was not permitted to present his growing conviction that he was only partly correct in his surmise regarding it. But during the winter he was able to make a more careful examination, and the results of that work make his apology for taking your time.

From New York and Brooklyn and St. Louis he obtained fresh, unbroken packages, when possible, but certainly fair samples of the best three makes of hydrogen peroxide. It was an easy matter to detect in all three the presence of not only hydrochloric, but also sulphuric acid. Not satisfied with his own tests, he went to Dr. William L. Dudley, professor of chemistry in our Vanderbilt University, and submitted to him three samples of the agent as before. His examination revealed a large percentage of HCl, and by another test a large quantity of H_2SO_4. Further, when he evaporated a portion of that from New York he found a whitish residue that was charred by heating strongly in the platinum cup.

It may be thought these discoveries amount to little, yet they rise

in importance when considered in connection with the statement of each manufacturer that his product is absolutely pure H_2O_2. One claims in his printed circular accompanying original packages, that he is "the sole manufacturer of chemically pure H_2O_2 to be used medicinally." Yet it can be (it was) shown from two original packages that both HCl and H_2SO_4 were present, with the residuum thrown in. He claims, also, that ozone is the active agent of his H_2O_2, when no ozone is present, attested by the absence of the odor of ozone. It is not stated that his is not a preparation of H_2O_2 with other things in it, but that these other things change its nature necessarily. If the profession is restricted to the use of such deceptive products, over reliable signatures, what wonder that results are strangely variable?

Now, to the phenomena observed by Professor Peirce. Any one of those three samples had enough HCl to dissolve the tooth after sufficient exposure to its action, but the calcium chloride formed by it being extremely soluble in water would not appear as a white mass. On the other hand, any one of the three had sufficient H_2SO_4 present to dissolve the tooth after sufficient maceration, and the calcium sulphate formed being insoluble in water would precipitate in a white mass at the bottom of the tube. Further still, as the acid grew weaker the sulphate would coat the tooth and retard or even stop the action, thus accounting for what he had observed.

As to the third inquiry of his threefold request, the tooth *was* attacked by the acids present, though not so irregularly as he had expected. This was settled at the time by several good observers in the Association.

In conclusion, it is desired to present the results of some reflections and experiments on the subject by your essayist. The distrust awakened in his mind by such flagrant departures from their statements quite naturally aroused the question whether we dentists ever had used any actual, pure hydrogen peroxide? Has anyone here ever used any but the commercial product of our best manufacturers? If not, then it is claimed we have always used a solution of H_2O_2 with acids present. This is about the only claim urged by this contribution, and it is presented to this body for consideration merely. The experiments in this connection have not been as thoroughly and extensively pursued as desired, but they may be properly presented as a report of progress in the matter. The H_2O_2 as obtained from the original package or fresh supply was used in pulpless teeth where pus was observed, and the effervescence was noted. On the very same occasion it was used in the canal of a sound tooth which had been reamed

out for the purpose, and the same evolution of gas was again observed. The point that was apparently made by this was, that the agent would cause this phenomenon, when used with pus or without it, when inside of a tooth. This experiment was repeated several times with substantially the same results.

Then the attempt was made to obtain this evolution of gas when the H_2O_2 was put in contact with pus outside of and away from a tooth. Pus was obtained from gum-margins and pulp-chambers and subjected to this same specimen of H_2O_2. As far as could be observed, there was no evolution of gas. This was repeated also with the same results.

It may be stated, parenthetically, that the tooth in the mouth is heated to about 99° F., which would be sufficiently high temperature to cause the rapid disengagement, comparatively, of the loosely combined oxygen, and the difference of temperature outside the mouth might account in some respects for the tardiness of action observed when the tooth was in the hand. But this does not account for the failure to obtain the same evolution of gas away from pus that may be seen when the pus is in a tooth—a calcium house. The next step was to free the H_2O_2 from all acids—that is, HCl and H_2SO. When testing failed to indicate their presence, it was carefully preserved for experiment. In the observations for several days, several times in each case I failed to see any evolution of gas whatever, in the canal or out of it, in contact with pus or away from it, in the mouth or in the tooth out of it. This was repeated with the same results. My failure to obtain any pus at the city hospital and from a neighboring surgeon was a disappointment, for I desired to compare results from action on pus pure and simple—"fresh, laudable pus"—with action on the mixture of pus and saliva found in the mouth. This I reserved for a better opportunity that never came. The last experiment was with the HCl by itself, used almost full strength. It produced almost the identical phenomena as those by the H_2O_2 in the first place, evolution of gas and all.

One word in extenuation of the use of H_2O_2 as obtained commercially. Although it should not be claimed to be what it is not, it certainly is a valuable combination as a detergent and germicide. Dr. Black, in discussing essential oils, incidentally states that HCl is one of the best antiseptics. Therefore we may use the mixed product with propriety, with perfect understanding of its nature. H_2O_2 does oxidize by the easy evolution of its loosely combined O, entering into union readily in the nascent state; but this action is not attended with the evolution of gas, as we have ordinarily supposed. There is

no philosophy to base it on. The query still remains, Have we, as dentists, ever used any H_2O_2 unmixed with acids?

DISCUSSION.

Dr. Peirce: I would like to say one word in extension of the interesting experiment performed by Dr. Stubblefield, and present at the same time my great obligation to him for the result of his experiment. The tooth I placed in the solution referred to I stated at the time was largely affected by excementosis, and the surprise to me was that this abnormal growth was rapidly acted upon until it was entirely removed from the root with not any perceptible action upon either the crown or the enamel of the tooth; and when the disintegration had gone to the extent of removing the cementum from the tooth and leaving only the dentine and enamel exposed, the action was very slow indeed,—in fact, hardly perceptible after the cementum had been removed, that is of both the abnormal and the normal growth; so that the tooth I presented to the Association had only the enamel and the dentine exposed, the cementum having all been dissolved, and my surprise was that the acid, if it was only an acid, acted so slowly upon the enamel and dentine while it acted so rapidly upon the cementum.

Dr. Abbott: I am very much pleased with this paper, and still it is sad to feel that for so many years we have been using peroxide of hydrogen and been deluded into the belief that it was a test for the presence of pus. It seems from actual experiment by Dr. Stubblefield that it is no test whatever, any more than hydrochloric acid slightly diluted. I have no doubt that many other substances would produce the same result in the pulp-canal of a tooth. Outside of the tooth they all act the same, no effervescence, no disturbance, nothing to indicate that it has any special action upon pus any more than it would have upon so much water, or upon blood.

Dr. Volck: It strikes me as a little curious that when a person gets this preparation, he should not try to see whether there is any oxygen in it. A simple touch of litmus paper will tell that. I think we will all find ourselves deceived in it. The preparation is hardly a chemical one. It is simply an intimate admixture of another atom of oxygen with water. I have made some few experiments, allowing the bottle of peroxide to stand open for a couple of hours, at the end of which time I found nothing in it but water. I doubt very much, if peroxide of hydrogen is exposed for a couple of days, whether there will be anything but water remaining.

Dr. G. J. Friedrichs: I must acknowledge that I was cognizant

that the peroxide of hydrogen I was using was not pure, that the manufacturers added hydrochloric acid and sulphuric acid in order that the combination would not disorganize as readily under ordinary temperatures, as it takes but very little heat to break it up. You have already heard from previous speakers that when it is injected into the tooth it is decomposed, yet here we have only about 90° of heat ; gas is evolved and nascent oxygen is given off. I think we have an excellent use for this remedy. In the first place the combination of hydrochloric and sulphuric acid is just in that proportion that it has a tendency to stimulate and heal.

Dr. Morgan : Can you give us the proportion ?

Dr. Friedrichs : When you have an abscess from which it is difficult to evacuate the pus, what better agent could you desire than this one of peroxide of hydrogen ? When injected, the heat disorganizing the combination, the oxygen is given off, and the result consequently is, it drives out the fluids that are contained in the cavity just as a charge of powder drives out shot from a gun.

Dr. Truman : While I am delighted with the results of Dr. Stubblefield's work, I shall continue to use hydrogen peroxide precisely the same as I have used it heretofore, for the reason practically as stated by Dr. Friedrichs. We find it one of the most valuable agents, whether it is as he describes it, or whether it is composed of one molecule of oxygen over water, as the manufacturers have stated, without any admixture. I think it would be a great mistake in the dental profession to abandon this agent. In cases of alveolar abscess that have failed to yield under other treatment, I affirm that the hydrogen peroxide has given the best results, and I know of no agent as yet with which necrosis of the jaw can be treated with the same good effect. Do not let us go wild over one decision. This agent has been before the profession now for several years, and, while it has a black eye to-day, let us remember its good work in the past. I believe much that is used is valueless, being kept in an atmosphere such as we have in this room, or as we generally have in our offices, away above 60°. It then becomes simply water. We must keep it cold all the time. The forcing out of pus is not of so much importance to me. I want it as a germicide, and I believe we have no better agent, under certain conditions, than hydrogen peroxide.

Dr. Ingersoll : I have long observed what has just been stated, that the probability is that peroxide of hydrogen is not a chemical compound ; but the oxygen is held in combination by force, not by affinity. Of course, when it is liberated from confinement it escapes,

and especially when bodily heat is added. I have tried it under various circumstances which convinced me of its instability. I have never had the confidence in peroxide that some have, for the reason that it lacks one element absolutely essential in antiseptic treatment, and that is a stimulating property. When used, therefore, it must be used in connection with some stimulating drug, because in nearly every diseased condition there is more or less morbidity of function. I have observed another thing with regard to it,—that it behaves badly in a closed wound, for instance in the antral cavity. In the use of it in case the opening into the nares is closed, and the cavity has not sufficient artificial drainage, the cheese-like sediment which it forms in its action on the pus remains as an irritant, and gives excessive pain. Every time I have used peroxide under such circumstances it has given very great pain. The expansion of the gas evolved is very great, causing a continuance of the pain for several hours. I have been disappointed in using it in some cases of pyorrhea alveolaris, from the fact that it is essential that it should come in contact with the pus at every point, while the difficulty in compelling the contact in the deep pockets where pus is found is very great.

I think we are inclined when we get hold of a new medicine to trust it too exclusively, and to throw aside everything else which we have before employed, however successfully. Therefore I wish to caution the profession against trusting it as we have in the past, for everything, and on all occasions where there is pus-formation.

Dr. Horton: Dr. Ingersoll speaks of the cheese-like formation in connection with the use of peroxide. I use warm water with chloride of sodium, and carefully syringe out the pockets where the pus is supposed to be, prior to using the peroxide, and I have used it with good results without any such effect as he has spoken of.

Dr. Marshall: Dr. Ingersoll opened up a question in which I have had a little experience. He spoke of the action of peroxide of hydrogen when injected into the antrum. I have had the same experience in regard to it, and I have abandoned its use on that account. I have also abandoned its use in cases of alveolar abscess. I will give you one illustration. I attempted to treat a lower first molar that had been drilled through into the bifurcation in trying to open the pulp-chamber. The gentleman who had made the operation had been unfortunate enough to pass his drill through to the bifurcation of the roots. When the blood flowed he thought he had struck the pulp, and he put in arsenic to devitalize it, and of course the arsenic went through and caused necrosis of the septum between the roots. That had been

done three years before I saw the case, but there had been a constant discharge of pus from the outside upon the face. I probed and found no necrosed bone, but a carious condition, and operated upon it by cutting this away with a bur, and then thought to wash it out by using peroxide of hydrogen, but it did not come out at the place where it ought to have come. Instead it extended along the jaw, entering the connective tissue, causing a welt on the side of the face inside of two minutes as large as my index finger. I took a lancet and cut down to it through the gum to give exit to the gas, but had a bad case of cellulitis that took several weeks to heal, and I said that was the last time that I would fool with peroxide of hydrogen in that kind of a place.

Dr. Stubblefield: I wish to answer one statement with reference to the use of peroxide as suggested by Prof. Truman. I think he is undoubtedly correct in using it in that case, but we put ourselves to unnecessary trouble in using it when we might as well use the aromatic sulphuric acid on necrosed surfaces. The valuable agents at work in this compound are certainly sulphuric acid and hydrochloric acid. Dr. Ingersoll speaks of the matter of stimulating action. I am of the opinion that those two acids supply him with quite sufficient stimulating power, but still his experience may not agree with mine. I have found that where I have had sloughing margins and pus-pockets, if I could go down with a little sharpened stick, carrying the acid thoroughly to all these surfaces, the detergent effect of the acid was followed by a healthy growth and the resumption of a very excellent condition.

With reference to the statement regarding the excessive pain after its injection in the antrum, I am of the opinion that it is the sulphuric acid proper in contact with water. You know in handling sulphuric acid and in diluting it we have to add acid to the water. Never pour the water in on a quantity of acid; if you do you will have an explosion varying in degree. If we throw in this fluid and it is too closely confined we have that kind of effervescence, which is possibly a kind of coagulation produced by the action of the acids, and then this natural distention and the elevation of temperature which would be brought about by the acid produces the pain. Pain is always greatest when it is caused by inflammation beneath thin bones or tough membranes. Therefore, the retention of these new products, either from inflammation or the action of the compound sold for pure hydrogen peroxide, and their sudden increase, produces the excessive pain.

SECTION I.—Continued.

BANDING ROOTS.

REMARKS BY DR. E. PARMLY BROWN.

The question of banding roots for crown- and bridge-work, for all kinds of crown- and all kinds of bridge-work, is still a very open question. My excuse for presenting this subject may be explained by stating that in the last two years cases have come under my observation which show the condition in which banding roots is to-day. When an eminent practitioner in this country comes to New York and brings an entire upper and under set of natural teeth, a few days before extracted from the mouth of a lady in his city, that had been crowned and banded around a few months before from one end to the other at the expense of six hundred dollars; when he brings that to New York and asks us not to get too near for fear we shall observe something we ought not to see or smell,—that means something serious. When he says he extracted these teeth to save the patient's life, after a consultation with eminent physicians; when that work is done by a crown- and bridge-worker, not a novice, but counted one of the best,—that means it is an open question, and very wide open. When during the same year a lady came to my office and said that she had bands driven up around her teeth until she jumped out of the chair and said, as Charlotte Cushman or any of our best tragedians would say, "Doctor, I shall be a raving maniac if you put another crown on or drive another band upon my teeth;" when a lady came to my office last year and said, "I was sitting in an office of a very large establishment in this city, having some crown- and bridge-work done, and an army officer entered and said, 'Dr. So-and-so, take these bands off my teeth or I will blow your brains out: I will give you five minutes to do it,'"—I say it is an open question, or I would not take up these few minutes.

I have always been an advocate for not banding, unless it cannot be helped. I mean that yet. But when bands can be devised that will not touch or injure one of the most delicate of all tissues of the human anatomy, the periosteal membrane around the necks of teeth; when a

band can be put on so that a patient is not disturbed any more than in an average dental operation ; then we can band a crown. In the present state of the art there should be never a gold band. If we are doing any piece of work and have a gold band, we cannot put it in our furnace and bake it. It should always be a platinum band, because a platinum band will always stand the fire for baking or soldering. I have here one of these platinum bands, which I believe to be entirely new. Adam may have put one of these on for Eve and not hurt her a bit for all I know ; but this is the way I am banding roots altogether. The system is applicable to all work on roots, where collars or caps are indicated, either to preserve cement, prevent splitting, or provide against great strain, for gold bridges, porcelain bridges, porcelain-faced or all-porcelain crowns. I take a piece of platinum, 30 to 36, very thin, always just as thin as I can get it to do the work with. Wrap it around and lap it over, just as you would if you were making a gold band. I find there are no two ends of roots alike, and that is why this system comes in well for capping those ends of roots. I take that band and put a piece of 30 or 60 rolled pure gold between the laps, hold it with the pliers, put a little flux in it and solder it, file it down and fit it on. Tell the lady something about the weather's being nice : do not let her know you are doing anything ; but when it is fitted properly take a fine-pointed pair of small scissors and take it out, after marking inside the root-margin, and slit it right down to the mark (about ten slits). That platinum band will bend over like pure gold after replacing it ; or slit it on the root, if the case will permit. If you want to make a magnificent adaptation, put your electric plugger on (if you are fortunate enough to have one around that is alive), or any kind of a plugger (if you are unfortunate), and work it around, holding the cap in place with an instrument or a wood point. The diagrams which I have drawn on the board illustrate the operation and illustrate the rest of the method I employ. You will see I have a perfect adaptation. This case, which I pass around, is one I made day before yesterday, and you notice this platinum band is not fastened onto the two-pin bicuspid crown ; it is just as I have plunged it over the natural root in this model. In extreme cases, where we have not time to solder, we cement that on. We have here a porcelain crown. It may be cemented on with the addition of this band without soldering. The band may be burnished in any undercut. Many roots have decided undercuts, as in the case cited where the lady's life was saved. These were cases where you could break off the sulphur end of a parlor match and hide it up between the gold band and the root. In most

of my cases I bake on porcelain, and cover up the band in front, fixing it so that there is room for a little film of porcelain in case of future recession. I have a lady here who I am willing to show to any of you who are anxious to see the operation in practical use.

It is proper to cut off teeth if ladies wear unsightly gold fillings. It is proper to cut them off and crown them. We are justified in cutting off a tooth at the present time, when five years ago it would have been considered a serious case of malpractice to do so. I look around me and see four or five eminent dentists who were spoken of a few days ago. A lady came to my office and said, "I want that lateral crowned." She said she could not get anybody to crown it. She mentioned the names of a number of eminent dentists who refused to do it. Would you not pull out a set of teeth to save a lady's life, as our friend did? Would you not cut off a tooth that preyed on her mind so that there was an abnormal growth there? I am not ashamed to say to these eminent men, who said it was malpractice, that I cut that tooth off. Some of them are looking at me. It is two months ago, and she is married now. She said, "This has been a nightmare to me for twenty years, all day long." She would look at her sisters, who were very much handsomer than she, and she would look in the glass and lay all the difference to that tooth. To cut off a defective tooth and replace it with one not as good is malpractice; but to cut off a defective tooth and replace it with a better one in strength, appearance, and comfort is dental art.

DISCUSSION.

Dr. Ames: I want to offer here a method of making a very close, almost a hermetically sealed joint between gold and porcelain, in crown- and bridge-work, by means of lapping pure gold, thin enough to nicely burnish with the porcelain. This affords the means of carrying the solder between the porcelain and the gold cap, making an accurate cap, as you will see by the specimens. These have been sent here by Dr. Hollingsworth, of Kansas City.

Dr. Carroll: Dr. Brown spoke of the propriety of cutting off a lateral for the purpose of getting rid of an unsightly tooth. I would not cut such a lateral off in order to have a root to band, but I would do what is here done in this case. It is a case of a lady of distinction of New York, who thought that in New York we were not sufficiently capable of doing a piece of work, and she went to Paris and fell into the hands of a distinguished practitioner there, and here is the impression of the case as finished by him. The two front teeth were

filled with gold. The anterior approximal corners were cut off and filled. She would not allow him to contour because of the unsightliness of the gold, and the lateral was cut off and a root banded and a tooth inserted upon it, and the distinguished operator, formerly an American dentist, inserted a little piece of V-shaped porcelain to supply the anterior corners of the two front superior incisors, which was backed with gold and hung to the left lateral incisor root with a banded pivoted crown inserted upon it. Any motion of the piece disclosed readily its artificial character. Alveolar abscess of the lateral ensued, and the case came into my hands for treatment, at the same time to restore the lost parts with a denture that would be more natural. After treating the abscess, I cut the posterior angle of the centrals sufficiently to allow two Weston crown-facings or veneers to be placed over them, took an impression of the parts in relation, and made a model, using the Carroll aluminum model and investing material, and mounted the veneer facings over the centrals, and a common pin tooth on the root of the lateral, then waxed up neatly as intended to be worn. Then the model with the teeth *in situ* was invested, and the bridge as constructed cast complete in aluminum, including the post, that passed into the root-canal prepared for its reception. The denture, when finished, telescoped neatly over the central incisors with the lateral in position on the root, and when cemented in place made a substantial bridge restoration with a very natural expression. This form of bridge restoration I have been using in many cases with great satisfaction, thus conserving the teeth with living pulps instead of destroying the pulp by cutting the teeth off at the gum, with the usual sequence of abscess and often loss of the teeth.

SECTION II.

Dental Education, Literature, and Nomenclature.

Report by LOUIS OTTOFY, Secretary of the Section.

Mr. President and Gentlemen: The Section on Dental Education, Literature, and Nomenclature begs leave to offer the following as its annual report:

We mourn the loss by death during the year of two members of this Section,—W. H. Atkinson and E. B. Ward,—the former an earnest, active member for many years, where his wise counsel in the past has been forcibly felt. The latter,—Dr. E. B. Ward,—a comparatively new light, of whom our knowledge enables us to say that, had he lived, he would have proven himself a worthy member of this Section and Association.

It has been the custom to annually report the number of dental colleges in active operation in the United States. At the close of the last session the number was thirty-three.

And it is a pleasure to report that no *practical* increase of this number has taken place during the year. At the commencements held since the last meeting of this Association, from these colleges there were graduated one thousand two hundred and forty-one persons, an increase of two hundred and seventy-eight over the preceding year. The total number of graduates during the past six years (1886–1891 inclusive) is four thousand eight hundred and forty-six. About twice as large a number of students are graduated now annually as there were five years ago.

Of the more than twelve hundred graduates this year, it required the combined strength of thirteen colleges (more than one-third of the entire number) to graduate less than one hundred students. Of the remaining eleven hundred, the power of eight more resulted in

about two hundred and fifty graduates, while the remaining three-fourths—being about nine hundred in number—are the outgrowth of the energy of twelve colleges.

The principal work of the Section during the year consisted in endeavoring to increase the interest of State and local societies in the American Dental Association, in order that its usefulness may be enhanced; that the reports of its Sections or Committees may be made more complete and more representative of the work of the entire profession. For this purpose a list of dental societies was prepared, and so far as was possible a list of members of the dental societies of the United States.

The list of societies is by no means complete, but is herewith presented as a part of this report.* It shows that we have in the United States at least one hundred and three dental societies, divided as follows:

National, 4; interstate, 7; State, 41; district, county, and local, 22; city, 29; total, 103.

Of these, there were represented in this Association last year by duly accredited delegates twenty-two societies, located in fifteen States and the District of Columbia. In other words, eighty-two societies and twenty-nine States were totally unrepresented.

Under a resolution adopted by this Association last year, a circular was issued by the chairman of the Executive Committee in co-operation with this Section, having for its object the awakening of interest in local societies, and if possible increased representation of them in this Association.

It was also designed to secure a report of the work of the societies for the various Sections, a digest of these reports to be the foundation of the Section or Committee reports. In a measure this effort has already brought fruit, as a number of the papers so far read at this meeting have been written and presented to the Sections as a result of this movement. It will be several years before the plan will operate perfectly. It is now the intention of the Section to request every local society (shortly before the convening of each one) during the year to have it appoint some one to make a report of the proceedings for this Association. In this manner we may obtain reports from most of the societies. Where and when possible, a member of the American Dental Association will be delegated to make a summarized report of the local society of which he is a member. Those societies which

* See Appendix.

are not now represented by delegates will be requested to send those who make the reports of their proceedings as delegates to our next meeting.

It is also the intention of the Section to annually publish a corrected list of dental societies, and to keep a record of the membership (now numbering about four thousand) of local societies.

It is also in order at this time to take notice of the plan lately promulgated by the Post-Graduate Dental Association of the United States. The Association has established a course of study on a plan similar to that of the Chautauqua Literary and Scientific Circle.

A course of three years' reading of strictly dental works for practitioners who are not graduates has been decided upon ; on the completion of this course the candidate is expected to pass an examination, and if the reading has been thorough a certificate to that effect will be issued to the successful candidate. He is then expected to take a practitioner's course in some dental college, on the completion of which he is entitled to full membership in the Post-Graduate Dental Association. He may then take a course of advanced reading, comprising the collateral sciences and general literature. If at the close of that course the candidate passes a successful examination, a certificate to that effect will be issued to him.

The entire scope and design of that association is to educate and elevate the practitioner whose early education has not been as thorough as might be desirable, or who, by the circumstance of location, practice, etc., is not able to take a full course in a dental college. This course is in no wise to conflict with the colleges or their students, but aims to reach that large majority of whom our profession is made up, whose faces are never or but seldom seen at our society meetings.

Regarding the work of Dr. Farrar on Irregularities, to the first volume of which extended reference was made in the last report of this Section, we learn that the second volume will be ready next spring and the third in the fall of 1892.

The subject of Nomenclature, though a part of the work of this Section, has been referred to the Committee on the Dental Congress of 1893, to be presented to a council composed of members of the profession of all countries, and we do not expect any definite advance in this line until the matter of nomenclature has been intelligently treated by a competent international body.

Dr. Jacob L. Williams, of Boston, has again brought to the attention of the Section the adoption of the term *oristry*, to supplant *dentistry*, the now generally accepted name of our calling. Oristry is said

to comprise all the branches relating to the treatment of the oral cavity, while dentistry only comprises the treatment of the teeth.

The Section reports one paper from Dr. C. R. E. Koch, of Chicago, entitled "State Boards (the People's Officers) and the Profession," which will now be read by Dr. C. N. Peirce, of the Section.

SECTION II.—Continued.

State Boards (the People's Officers) and the Profession.

Paper by CHAS. R. E. KOCH, Chairman of the Section.

VISIONARIES and poetic idealists may seldom accomplish practical results themselves, but the sentiments kindled by them have frequently been the corner-stones upon which men of a more practical turn of mind have reared strong and enduring structures.

Before this and kindred bodies, many Utopian, and what at the present time appear impracticable, ideas have been advanced as to the best means of elevating the educational standard of our profession. The variety of these ideas, and the discussions which have followed them, have established beyond doubt the existence of unanimity on at least one question: that dentists shall be better and more uniformly educated. If we could only stop theorizing, and for the time being submit to the conditions that confront us, we could realize in the near future the desires that now seem so far away in their attainment.

Let us remember that, while we are citizens of the United States, we are also citizens of the several States in which we reside. By the laws of the nation, the right to make their own police regulations for the better security and protection of the citizens has been reserved to the several States.

In nearly all of these States, under this power, the people have enacted laws for the purpose of regulating the practice of dentistry within their own limits. These laws are not designed to benefit the dentist especially; if they were, they would be class legislation, and, therefore, invalid in most States.

The spirit, if not the letter of these laws, invariably is that the people for whose benefit alone they are enacted should secure a guarantee that the future dentist shall be universally competent beyond the dentist of the past. This is a government for the people as well as by the people, and we must not lose sight of the fact that the people

judge us in the aggregate. It has been said that the status of a profession is established by the brightest light within it. The people do not believe this, but they judge a profession by the men they know belonging to it, and are apt to concede to it such respect and esteem as the standard by which they gauge it impresses their minds.

If, therefore, we love and respect our own calling, and have a desire that the laity shall equally respect it, we must labor in the direction of universal education, and of a standard that shall be uniform and sufficient. What the people require, what they have a right to ask of the dentist, and what they have a right to compel regarding him, is not that he shall become a post-graduate of an institution deriving its authority from the national government in addition to that already received from the State government, or that he shall be licensed by a national board ; they are not interested in having a few men reach the zenith of prodigious attainments, but they have a right to demand that all dentists who shall hereafter offer their professional services to them shall commence with such a degree of education and preparation that they, the people, will be secure in trusting the care of their teeth and associate parts to anyone authorized to hold himself out as a dentist.

If we can all agree at the outset that the ultimate destiny of the embryonic dentist is to serve the people,—to serve them intelligently and faithfully,—we shall have adopted a basic principle, and one which alone ought to govern our educators.

The question with the dean of a faculty regarding the matriculant would not be, "Has he the necessary funds to pay his tuition? Has he influential backing?" or, "Is he smart enough to make money so that he will pay his note by and by, if I take this in payment of the fees?" but the only question will be, as in all conscience it should be now in all schools, and as the writer cheerfully admits it is in a few, "Has he the necessary qualifications of mind, body, and soul to serve the people faithfully in this particular sphere?"

If this basic principle is alike adhered to when the time of graduation arrives, the diploma fee will not counterbalance the insufficiency in standing when the minds of the professors are in doubt. If this condition of things were the rule, and the States could compel the professors or faculties to carry it out and to permit none but those especially qualified by experience, study, and peculiar adaptation to occupy the positions of professors, a diploma from a college would not only be a *prima facie*, but an absolute evidence of the holder's qualifications.

The States, in the exercise of their police power, have, however, not interfered in the dental-college business. With few exceptions,

they exercise no supervision over the purely business enterprise of educating. They do not appoint, confirm, or examine the teachers ; they simply permit or authorize them to do such teaching as they see fit. In many States the people by their enactments take the position that the work of the colleges must be reviewed by some one authorized as the people's representative. In some States the boards are compelled to issue the license to practice to all who hold diplomas from *reputable* colleges. In the event that the board says a college is not reputable, its graduates cannot be recognized by license to practice. In other States the work of the colleges is reviewed by examinations of all graduates. This, the writer believes, from the standpoint of the people, is the only safe position. It is equitable in every way. A uniform adoption of laws compelling, or at least permitting, the examination of all candidates who desire to begin practice in the future, by the several States, is needed. But much has been accomplished, much more can be accomplished, under conditions of various laws as they now exist.

The large majority of our colleges are private ventures, organized under some loosely-drawn general law. All honor to the men and the institutions whose motive of labor has been first and foremost to educate. They need protecting.

The people cannot distinguish between the college that is incorporated under the same law and conditions, for the ostensible purpose of educating, and which really attempts to do so, and the institution in which education is ostensible only,—which is conducted for "revenue only," and in which men without experience or reputation may be the professors.

In some States the charter for such an institution can be obtained for an exceedingly small sum, and the parties named in the charter are not required to give any evidence that they know anything about the business of educating upon which they are about to enter. "The butcher, the baker, and the candlestick-maker" can be chartered as a dental college, and can issue diplomas, which in some of our States would have lawful standing and could not be questioned.

In most of our States, in order to establish something like uniformity within the limits of each, in the required qualifications of dentists, boards have been established with varying powers in the different States.

These boards are intended for the protection of the people against imposition by dental quacks or pretenders. They are the only representatives of the people and protection of its interests in the matter of

the services of the dental profession. They are the only dentists who, as public servants in office, under an obligation of an oath, are responsible to the people for the enforcement of the law and the improvement generally of the dental services furnished the people.

It has been said that men who have never been in a dental college themselves have been appointed on such boards,—that they have been appointed for political reasons where the appointing power rests with the governor, or that they have been appointed because of their skill in manipulation of voters where state societies choose the members of the board. These statements may for argument's sake be admitted to be true. What of it? These boards are created to examine, not to teach. They are intended to enforce the laws. They require strong good sense, a knowledge of the laws, and a courage that shall give them power to enforce these laws on the part of their individual members.

The manner of selection of our judiciary is open to objection in the same way, yet it is a question if for that reason there is a single sensible man in the United States who disregards the decrees of our courts.

Personally, the writer does not now recall a single appointment on a State board of dental examiners in which the appointee was not well and favorably known in his profession in his own State. While under their oath of office, members of the boards are first and foremost the executive officers of the laws of their respective States; they are, secondarily, also the intelligent lovers of the profession which had honored them before the State executives did. Is it unreasonable to believe that men who are guided by an accumulated love of many years, who have had the affection and friendship of their progressive confrères, to which is to be added the conscientious sense of official duty, will do aught that is not in the direction of the elevation of the profession? Is it not reasonable to credit men who have nothing to gain except by a faithful discharge of duty, whose field of operation is broad,—the members of boards,—with more circumspection than that of the professors of any college, who must more or less be guided by questions of finance, and whose interest is largely, of necessity, concentrated within the walls of their own institutions?

It is far from the writer's intention to belittle the noble efforts that have been made by a grand galaxy of magnificent teachers, who have honestly, earnestly, courageously, and studiously labored to put our calling in the category of the learned professions. It is as much due to them that they should be separated from the degradation of disqualified pretenders as it is due to the profession generally. The

various State boards, within the sphere in which they lawfully exercise their functions, will accomplish this if the friends of progress will lend them their unstinted aid and support.

It must be borne in mind that dental colleges have increased to an unreasonable extent since the people have generally begun to legislate in this matter. We have now nearly as many colleges in the land as there were annual graduates thirty years ago. Commercially speaking, the will of the people as expressed by law created a market for the product of the dental colleges.

Is it incompatible with this condition of things that the people should demand a standard quality in the manufacture?

There are, in all communities, people who are at all times "agin the government." They oppose law because it is law.

There is also a class who are willing to see the law enforced against their neighbors, but complain of despotism if an executive calls their attention to their own transgression. Boards everywhere will tell you that the dental community has representatives of both these classes. There is a large variation in the provisions of the laws of the States on this subject, and a great many friends of progress think it is impossible to accomplish anything until this whole matter shall be controlled by a national board. It may be well to hope for, to work for a better machinery with which to do this work, but it seems to the writer extremely doubtful, provided this Utopian wish could be realized, if such a board would not be liable to the same objections, the same criticisms, and the same blocking of wheels that is now endured by the several boards.

A national board, while our political complexion is as now, is of course out of the question. There are matters of greater public concern than ours that need uniform national legislation, but which are left to the several States to care for. Take, for instance, the question of marriage and divorce. It is impossible to obtain national enactment in a matter involving the most serious social and property relations of the entire population.

Had the early practitioners abstained from operating with the use of napkins, duct-compressors, tongue-holders, and similar appliances because their difficulties of operation were great, and said, "Wait till Dr. Barnum shall give us his great discovery," they would have been about on a parallel line with our friends who deem our present boards useless, ineffectual, and impotent, and who appear to be awaiting the consummation of plans which they elaborate in their minds only.

It is common sense to accomplish the best results with the oppor-

tunities you have,—to use the tools at your command in such a manner as to secure the best possible result attainable with them.

Gentlemen of the Association, we are all—practitioners, professors, and members of dental boards—brothers in one great family. We should all lend our energies in one direction. The future children of this family must be educated on a higher plane than their sires. The very small minority of this family, during a brief period, has been designated by the people to supervise that education. They are by law empowered, in some instances, if they are satisfied that your schools are not sufficient or satisfactory, to designate them as not reputable, in which case the product of that school—its graduates—is denied the privilege of practicing in those States. In other States the product of all schools must pass muster, be inspected, and approved of by their boards before it can enter the profession of those States.

There is no reason why your brethren in office everywhere, who must sooner or later retire and be followed by others of you, should not receive the heartiest support from every practitioner who loves his profession, and from every professor who is such for the purpose of educating the future dentist first, and for all other reasons incidentally only.

Four years of membership on a dental board has taught the writer the perplexities resulting from a lack of uniformity in laws, and from their insufficiency to enforce both their letter and their spirit ; but as this will probably be the last time that he can speak to you as a public officer, by reason of his becoming a private citizen before this Association shall meet again, he feels it incumbent upon him to testify from his experience and observation to the good that even faulty and dissimilar laws have accomplished ; to urge upon you in your individual capacities to sustain to your utmost ability both the law and its chosen executives ; to assure you that while you are as earnest in the desire for progress as they are, they occupy a position for the time being which forces them to see more than you. They can accomplish more, having your moral support, than they can without it. We are not living, as some would have us believe, in a state of war of a triangular kind—the practitioners, the faculties, and the boards each occupying a different and a hostile camp. We are a trinity,—three in one.

The recruiting of the profession must be done with greater circumspection than in the past by the colleges.

The boards must see that the colleges do this. Honorable colleges,

honorable professors, will need no exercise, or attempt at exercise, of such power as the law may give the several boards, and if the boards in the exercise of fidelity to their oath of office and love of their profession are compelled to exercise the powers vested in them, all good men everywhere should sustain them. The penalties of law are never incurred by the law-abiding. If the position that has frequently been taken, that members of the boards are often themselves unfit to act as examiners, be true, I wish to say to you, lend your aid with these imperfect tools to construct better material for the future years. If none but competent dentists hereafter can begin to practice, it will be impossible in a few years for any governor to appoint an incompetent man on these boards.

The writer has no thought of attempting to weary this Association, but he is quite sure that many of you have never had your minds directed to the fact that you exercise your functions and discharge the obligations of your practices simply by the license of the people. Whether this license is a visible document or not, does not alter the fact.

Because the people, in the earlier history of the country, when it was less densely settled, did not see fit to assert their right of police regulation in matters that refer to the physical or moral health, does not prove that they had no such right.

The holding of a diploma brings no vested right with it excepting when and where it is conceded by law. The people have a right to demand, if they see fit, that the physician, the pharmaceutist, the dentist, the lawyer, the teacher, shall have the necessary qualifications to discharge their duty, and in many States this right is asserted. If the people, so far as dentistry is concerned, should not recognize any diploma whatsoever, but force every new candidate for practice to take an examination before a board, they would follow out the practice existing in older countries, they would secure a better educated class of professional men, and they would strengthen and encourage our best colleges to better work. The indifferent institutions and indifferent teachers would speedily have to go into voluntary or involuntary liquidation, because there would be no longer any market for their manufacture.

The writer has met the objection that he is arrogating unto himself, or his class (members of State boards), greater knowledge and circumspection than that possessed by professors and faculties, while the fact is said to be the opposite; and therefore the decree of a faculty ought to have more potency than the decree of a board.

We graduate from our State and city schools men in various de-

partments of learning, yet their diplomas are not recognized by school boards, but an examination is required before the graduate can practice the profession of teaching. These schools are organized and conducted at public cost, and yet the public is not satisfied with the evidence borne upon a diploma, but requires a further examination by a board outside of the faculty that taught.

On the other hand, nearly all our medical, dental, and pharmaceutical schools are private enterprises,—the diploma and tuition are both issued for a consideration,—and it does not seem unreasonable if the people, having the right so to do, see fit through their officers to verify the qualifications of graduates as certified to on their diplomas. The public would certainly be expected to place more weight upon a certificate bearing the signatures of its own officers than upon that of a number of private individuals, be they ever so exalted, who cannot divest themselves of the implication of conducting a college for personal gain.

In conclusion, the writer desires to express the wish that dentists generally would take a greater interest in the duties and trials and vexations that come to members of State boards in the discharge of their duty; that they would learn the peculiar legal positions and requirements of their profession in their own States; that they would strengthen the hands of their confrères who for the time being are in office. If we all would do this, our profession would be more respected; the people, whose voice and will in this country have supreme potency, would be better served, and when we finally lay down the forceps, the plugger, and the mallet, our consciences will tell us that we have laid aside our selfish ambitions, and individual glorification, in the cause of the general good.

DISCUSSION.

Dr. Abbott: On the whole, I think the contents of the paper very good. I do not, however, like the general criticism, or general slur, if you please, that is thrown out in the paper, that colleges or faculties of colleges sell their diplomas for thirty dollars. This I do not think is proper or justifiable, and particularly coming from a man who holds no diploma at all, and who knows really very little, if anything, about dental colleges.

Dr. Patterson: He holds an honorary diploma.

Dr. Abbott: That is just equal to nothing. I have no doubt he speaks feelingly in many parts of his paper, because of the fact that

he is located in a community of colleges. They are all around him ; they are all over him,—so thick you can hardly throw a stone in any direction without hitting one ; but it is not fair to judge all institutions by a few bad ones that there may be of his acquaintance. I believe the encouragement of dental education by this Association, by State boards of examiners, by everyone connected with the profession, is laudable ; it should be aided in every way it can be. I believe that the State boards of examiners are all very well in their way, but I believe that no State board should be allowed to examine a man who does not come to them with a diploma from a reputable dental college to start with. I do not believe it is fair nor right to take a man who has been rejected by a dental college and pass him by a State board, and let him loose upon the community to practice. I do not believe it is right to pass a man who has taken but one course of lectures by a board of examiners, and let him out upon a community to practice.

DR. BARRETT : Can you give us an instance?

DR. ABBOTT : In Illinois. This very gentleman was one of the board who did it. If the law allows such proceedings, it seems to me the law should be amended. There is no reason nor justice in it. It marks an injury to colleges and to the profession, and is an outrage upon the community.

DR. CRAWFORD : Outside of scientific questions pertaining to the art of dentistry, in my humble judgment, the question of legislation is the most important one that addresses itself to the dental profession to-day. I shall not speak to the ethical questions in the case ; I shall not discuss the question of courtesy that should exist between all parties concerned ; but I shall look to the legal aspect of the question. I am not a lawyer, but a man who claims to have a limited degree of common sense. I claim the right to my opinion upon a question that I regard of so much practical importance, not only to the dental profession, but to the people of the United States. One plea in the paper was that the people demanded and that the people were interested in the enforcement of rigid laws. If you put it upon that plea I shall certainly claim the question on the other side, because it is a fact that there is not a sufficient number of competent dentists in America to serve the American people. Therefore the discouragement of legitimate institutions of learning is contrary to the better interests of the whole people, because they are not supplied with a sufficient number of men to render the services that are necessary. While I was unfortunate in my education, not having the advantage

of a college training, what little I did get being in a log school-house, yet I was always taught to look upon that, humble as it was, as a consecrated spot. So I stand here to-day, not being a college man, and I say that there is no profession whose institutions of learning are so universally respectable as the dental colleges of America; and while the people need protection and while the profession need protection, these institutions of learning need some protection and encouragement, too.

In regard to the legal aspect of the question. I am not much of a man to make a go-between, but there is a go-between in this case that I would accept, and that is this: Touching the question who shall be examined, let each State in the Union say that the persons holding a diploma from a reputable institution of learning shall be admitted to practice without further examination; but in the same connection give the board in each State the power and authority to pass upon the reputability of the diploma that he holds. That is maintaining the doctrine of State rights which some of us hold and appreciate so much, while to refer the adjudication of this question to a national board would abrogate that feature, and that I am opposed to. Our law in Tennessee on that question I hold is a model, and I believe it would stand the test of the most severe judicial investigation that could be brought to bear; that is to say, that in the case of every institution of learning, when the board passes favorably upon the question of its reputability and correctness, its parchments ought to be a sufficient guarantee. That, in my judgment, will finally be the solution of the question, and, if it is, it will be a most satisfactory solution. Then everybody can be accorded all of their rights. A good, reputable institution of learning will have its diplomas recognized. A disreputable, nefarious ulcer upon the body of the educational system of this country will be expunged, because this board will in solemn judgment, under oath, say that its teachings are not conducted in accordance with the better interests of the country. I hold there is the remedy, and it is the duty of every man to move in conjunction against an institution of that kind performing the functions of a dental college. It will soon go out of existence for want of patronage.

One other thing in support of my position. In approaching the Legislature of the State of Tennessee, I took the smaller body and asked each member what he thought in reference to this matter, whether we ought to recognize diplomas or not. Every single member of the Senate, except one, said they ought to be recognized. Go out and ask each reputable dentist what he thinks about it. Nine

out of ten will tell you the same. Go to every competent juror, and he will say that every reputable diploma ought to be recognized without a further examination. I hold that the idea that in the voice of the people we have the expression of the voice of God there is more than ordinary people conceive. So long as I live in a free country, I am going to stick to what I believe to be right, although every State board should oppose me in their convictions.

DR. CRAVENS: I wanted to make a speech on this subject, but Dr. Crawford has made it for me.

DR. BARRETT: We are all laboring for the same common end, but the great difficulty is that we look upon opposite sides of the shield. The colleges are sometimes viewed with suspicion because the masses, unacquainted with their practical work, suppose them to be a kind of close corporation, organized for the express purpose of making money. In fact, that is the crime which, day after day, is either covertly intimated or openly charged. If it be urged upon the part of examining boards, what I believe to be absolutely true, that they are working conscientiously and honestly for the best interests of the profession, that they desire to stand as safeguards against any professional irregularities, the same thing may be claimed as true of the colleges. The examining boards offer no means for education. They may be entirely disinterested in their labors, but it must not be forgotten that in their highest *rôles* they but act as detectives. The colleges are the only sources of instruction, and their hands should be sustained. What would we be without schools? There is no other opportunity, there is no other power given under Heaven or among men that can be substituted for them. The boards cannot take their place. Why should they assume police functions, and why should not the two work in harmony? What is the difficulty? Too often there are appointed upon boards men who themselves have pursued no curriculum of study. They are unacquainted with the methods of education, and know not the systems of the schools. How shall such men determine technical educational matters with which they have no acquaintance? Nine-tenths of the criticisms of the schools come from men who, if they have a degree at all, possess one that is not an evidence of the pursuit of any systematic course of study. Is it any wonder that the schools object to the censorship of men who have no practical acquaintance with educational methods?

Every instructor has a peculiar method of his own by which he reaches the ends to be gained. A board, the members of which have

not been scientifically educated, may desire honestly and conscientiously to determine the amount of information which a student possesses, and to pass and adjudicate upon his proper intellectual status, but they are not acquainted with the methods by which he obtained his technical information; or a student may come before them who once passed a creditable examination, but with the lapse of time the technicalities have passed out of his mind. He knows the functions of a muscle, but may have forgotten its insertion. The members of the board, not having passed through the same course of study, are intent, perhaps, only upon technical knowledge. They have learned certain questions and answers, and are indignant that the graduate of a school cannot give the deep origin of one of the cranial nerves, and yet the candidate may possess a perfect knowledge of the function of that nerve, the physiology of which the examiner may be totally ignorant of. He asked an arbitrary question perhaps, which was not an indication of anything but mere school-book terminology, no professional principle being involved. The examiner had his little memorandum in his pocket perhaps, lest he might forget. The student had no such reminder, and not being fresh from his books or his school, forgot what he really knew. How many of you here present can answer questions concerning the origin and insertion of the principal muscles? I cannot do it, and I passed through a strict course in a medical school; yet examiners demand this technical information. Instead of being able to go through with the methods and educe from the student that which he really knows of the principles of practice, they perhaps ask questions which they have committed to memory for the occasion. That is an unjust method of examining the student. Understand, I do not accuse the boards of willful injustice, but with the best intentions in the world their methods, unless they are themselves experienced instructors, may be such as to work a serious wrong to a worthily-equipped man.

It has been proposed that a national board of examiners should be appointed. I am most heartily in favor of such a board. Their duties should be to examine the members of the State boards of examiners, to see whether they are qualified for their positions. I see by the long-continued applause that this strikes a responsive chord in almost every breast. I believe that it is the sense of justice which you all feel that thus stirs you. There are two sides to this question of qualification. There is sauce for the goose as well as for the gander. The critic should first demonstrate his fitness to sit in judgment.

Very frequently it is the boards themselves that have obtained the

legislation which makes men without special fitness the judges of the schools. Influential, able men, men of good judgment, upright men, actuated by commendable motives, but without degrees themselves, have obtained the passage of a law that enables them to sit in judgment on those who have passed through the schools. Their assumption of superiority and judicial authority causes a natural friction between the two. No one questions their purity and the honesty of their motives; but why should the purity and honesty of the motives of the educators be questioned? It is said they demand a fee for the conferring of a diploma. So do the boards, whenever they can get it. In New York they demand a fee of twenty dollars for the conferring of a diploma that represents no teaching whatever. Teachers have a right to compensation for their labors. But these men toil not, neither do they spin, yet their fees, or that of the society which they represent, are made certain.

But this is a side issue. Every man has a right to compensation for skilled labor, whether of head or hand. The matter of fees should not enter into this discussion, for there is no principle involved in that. But men who claim to be engaged in the same good work should not be laboring at cross-purposes with each other. Educational boards and the colleges must come together. They must, in some way or other, harmonize their views, or there is going to be some kind of disruption. There must be an appeal to the courts to establish the right, and to find out whether a general diploma from a recognized college is good for anything. A mandamus might be very easily obtained which would compel a board to show cause for their particular action in refusing to recognize a diploma from a reputable college. Such a mandamus could not be refused if asked for.

There are, then, these acknowledged points of friction, and they must be removed. The boards and the dental colleges must be brought into sympathy with each other. Both have important functions. I believe the office of the college is the more momentous, because it is the basis of the whole thing, and gives the educational facilities which can be obtained at no other hands, and which the boards do not pretend to offer. Is it anything strange that a college which is organized for imparting information should object to having judgment passed upon it by men who, in many cases, are not qualified for the office which they assume and arrogate to themselves? As I understand the question, that is the source of the complaint of the colleges.

On the other hand, we know that there are schools in existence today which are conferring degrees without the proper qualifications on

the part of the students, and if such schools are to have no supervision, if their diplomas are to be acknowledged without question and without scrutiny, what is to become of our educational system? There must be some power behind the colleges which shall force them into compliance with the universal educational law. But one complaint on the part of the colleges is that the State boards pay little, if any, attention to those schools which are notoriously disreputable; that they do not attempt to drive out of existence the Delavan institutions, but confine their covert or open attacks to those which are doing their best to raise the standard of dental education. I believe the solution of all this may be found in an examination, by an authority whose competency none can question, into the methods, the equipment, and the thoroughness of each school. This examination should be exhaustive and minute. Such a board would thus be enabled to judge of the status of the college, and, having once recognized it, as long as it remained faithful to its trust its diplomas should not be dishonored. The methods of every school should be passed upon by examining boards competent for the task, and, having done that, they should not call in question their individual interests in the granting of a degree.

There is yet something beyond this. I have advocated for some years, and it now is the medical law in the State of New York, that no teaching faculty shall confer its diplomas. It is the duty of the teachers to teach, and not to confer honors. I would have a State Board of Regents, before whom should appear students from every college. The medical colleges have such a board now in this State. Before that, should appear every student of every college in the State for examination, and, if found worthy, by this board should be conferred the degrees. Then the schools would devote themselves entirely to teaching, giving up their whole time to the education of the youth. All opportunities for irregularity in the granting of degrees would be removed, and schools would no longer be open to the charge that they are working for the money which is in it. Every diploma would then represent the opinion of men who were unbiased, and who could not exhibit favoritism. The students would all be examined by men of experience, who would know how to elicit the exact amount of knowledge possessed. Under such a system there would doubtless be a weeding-out among professors, and the men who were mere tacticians and shrewd managers would give place to those who had the faculty of imparting information. The schools which so equipped their students as to give them a reasonable certainty of passing would be the

survivors, while those which were in existence mainly to afford a title to men who had nothing else to distinguish them would fall into disrepute. The question of the requisite number of colleges would thus settle itself, and only the really good colleges could survive.

DR. PATTERSON: I would like to hear from the other side. I would like to see fair play.

DR. CROUSE: If the meetings of this Association accomplish what should be accomplished, we must get at the fountain-head for our reports in the different Sections,—that is, we must have a report of whatever is being done, in literary work, in the different local societies, and have these reports embodied in whatever Section they belong. An effort was made in this direction this year, and, although imperfectly understood, was the means of bringing more matter to the different Sections for reports than ever before.

I believe when we get this matter fully understood and properly managed there will be no need of the constant complaints that are now being made of the Sections being a failure. And I predict a great future for this Association when all that is being done of importance in literary work each year in the United States is reported at the meetings. This matter was referred to in this report, and I thought to elaborate it a little.

SECTION III.

Operative Dentistry.

Methods of Regulating Teeth.

Paper by V. H. JACKSON, of the Section.

SINCE reading before this Association, in 1889, a paper on "Some Methods of Regulating Teeth," in which was described a system of using removable spring appliances, valuable methods have been developed, some of which will be described, with reference to models and apparatus, showing in detail the manner of constructing the appliances.

It is not the present intention to enter into a discussion of the reasons for advocating early regulating, as that is not the purpose of this paper, which leaves the question for consideration at another time.

It is, however, the opinion of the writer that each tooth should be encouraged to take a correct position in the circle of the arch while erupting (or as soon thereafter as practicable), in order to promote the proper development of the jaw, for the teeth next to be erupted are thus more likely to do so in proper position and order. Only a portion of the alveolar process that forms the sockets for the roots of the teeth is developed until the teeth are fully erupted. For this reason a slight pressure will change their position.

When convinced of the advisability of regulating teeth for young patients, several devices have been adopted with partial satisfaction, but none as yet have met all the requirements so perfectly as the "crib," which is equally applicable to patients of every age.

Impressions taken of irregular teeth for the purpose of making appliances are usually more satisfactory when taken with some of the modelling compounds, as the surface of the model will be much smoother than when taken in plaster, and the compound is more

agreeable to the patient. It should be hardened as quickly as possible by the application of small napkins about two inches square, folded and moistened in ice-water.

The impression cup should be well shaped to the arch.

If the teeth are long and there is danger of the compound dragging while being removed, a quantity of pulverized soapstone should be sifted over the surface before inserting. If there are undercuts between or cavities in the teeth that are of such shape as to cause the compound to drag while removing, they should be carefully filled with wax or other material. If the second or third molar is inclined forward into the space formerly occupied by the first molar to such an extent as to prevent getting a perfect impression, it can be overcome by either placing a rounded piece of soft compound longitudinally between it and the tooth next in front, and allowing it to harden in such shape that there will be no undercuts, or by shaping a small piece to the gum and mesial surface of the inclining tooth, to which it may be ligated. When well shaped and sufficiently hard, it should be covered with one or two layers of thin moist paper, and the impression taken either in plaster or modelling compound. The parts are then removed and placed together. If the operation is well performed, a perfect impression is the result. Water injected from a syringe under the lip when removing the impression will relieve the tendency to suction, and thus avoid the danger of drawing the compound up in the center, which so often spoils the impression. Forcing water under the lip with the syringe when removing plaster impressions is found to be invaluable, as it furnishes the moisture demanded by the hardening plaster and causes it to separate from the mucous membrane.

In taking an impression of a model to make a duplicate, dry heat is preferred for softening the compound. The model and compound should be well covered with soapstone as before described.

Since the first publication of this system of retaining plates and cribs,* it has been constantly employed with slight improvements in its adaptation and method of manipulation, and has been demonstrated at various clinics as a most complete system for moving teeth.

The models are to be prepared by carving the plaster well away from the gum portion at the necks of teeth that are selected for anchorage, choosing usually the temporary molars, bicuspids, or permanent molars.

A piece of any metal suited to the purpose, and shaped like a partial clasp, is formed to either or both the lingual or labial surface of the

* *Dental Cosmos*, Vol. XXIX, page 373.

teeth to be used as anchors, usually arranging the metal on the lingual side only, and choosing either very thin gold, block tin, rolled copper tinned, German silver, or tagger's tin. The latter works most easily, but is apt to corrode and should be often polished. After the metal is cut to proper form, it is contoured, which is an easy task, by using the contouring pliers made by The S. S. White Dental Manufacturing Co. for contouring gold crowns, with which pliers the metal may be hollowed to fit the contour of the tooth ; it should be pressed well up about the neck, and at the same time made to curve over the grinding-surface between the teeth to prevent the appliance from pressing on the gum.

If adjoining teeth are to be used as anchors, the metals are arranged on each, and united at the junction of the teeth. A spring wire, about No. 20 or a little larger, as the case may require, is formed so that it will fit the labial side of the tooth, with both ends passing over the arch at the junction of the adjoining teeth, and curved about the lingual side near the gum line, to rest on the metal described ; but

FIG. 1. FIG. 2. FIG. 3.

should be made to fit loosely so as not to injure the plaster model when removing it. The wire is most easily formed by first bending it at right angles (Fig. 1), leaving the width between the parallel sides equal to the antero-posterior width of the tooth to be clasped. The part that is to clasp the neck of the tooth is then so curved with clasp-benders that it will be perfectly adapted to the curve of the labial side of the tooth (Fig. 2). Both wires are then placed in the clasp-bender at proper distance from the curved portion, and bent nearly to a right angle to cause them to pass over the grinding-surface, and again bent in the same manner to extend toward the neck of the tooth on the lingual side (Fig. 3). The ends are then bent toward each other near the gum line over the metal previously described, as seen at A, in Fig. 4. If the appliance is to be attached to the teeth of the opposite side of the arch, the crib should be constructed in the same manner on that side. A base wire, which is usually of a larger size, is then formed to the lingual side of the intermediate teeth, with its ends passing over the metal described, on either side of the arch.

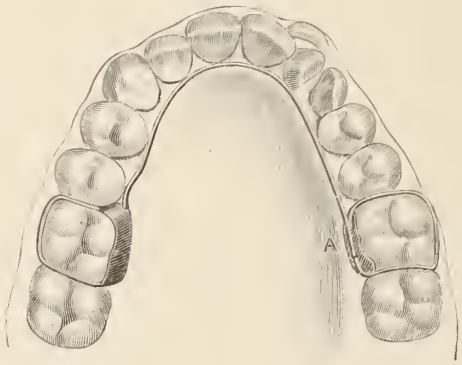
The wire is held in position on the model and is soldered with the

clasp spring to the metal described, by laying on them a piece of soft solder or tin sufficiently large to finish the soldering at once. The parts are then fluxed with chloride of zinc, and fused with a hot soldering iron. When using steel spring wire, the chloride of zinc should not be used until the soldering iron is ready for soldering, as it corrodes the steel in a few moments sufficiently to interfere with the union.

The preceding process simplifies the previously published method of making nearly all the crib of one piece of metal, which often proves difficult; this permits it to be made in sections, that are adapted to the different parts of the model perfectly, and are then united while in position, which insures a perfect adaptation if the model has not been injured by handling. An additional spring can be added at any time.

A narrow strip of tinned copper or tagger's tin is used in prefer-

Fig. 4.



ence to the binding wire formerly described for winding the joints in uniting springs, etc. The strip is wound about the parts in the same manner as the binding wire, and the solder flows over it more freely. Copper wire gauze and perforated tin have been used to advantage.

About three years ago it was observed that when copper was used in small quantity, as binding wire and other forms in appliances that were retained for long periods of time in contact with the teeth for regulating and retaining them, there appeared to be no consequent injury in the way of structural tooth-changes or decomposition of food-particles underneath the fixture. The subsequently continuous use of copper has tended to prove its detersive properties in this connection.

At a public clinic recently, while the writer was relating the advantages of using copper for similar purposes in the mouth, Dr. Walter S. Elliott, of Sag Harbor, N. Y., came forward and exhibited a rub-

ber plate that he was wearing, that had copper covering the portions of the rubber that came in contact with the natural teeth. The teeth had formerly been extremely sensitive, but he now suffers no inconvenience. No injurious effects have as yet in any case been experienced from its use.

The common and reckless extraction of temporary and permanent teeth to relieve crowding should be discouraged, and in preference, when necessary, an appliance be made for spreading either the superior or inferior arch.

If there is insufficient room for the free eruption of the permanent teeth, it is best to begin to expand the arch, if necessary, when the incisors are erupting, an operation easily accomplished by means of the crib appliances.

Correcting the position of irregular inferior incisors will often correct the position of irregular superior incisors, if undertaken while these are erupting, or soon afterward. If two or more teeth are to be clasped, the width between the parallel wires, as seen in Figs. 1 and 2, should permit them to rest on the distal and mesial coronal sides of the two respectively, with the portion between them conformed to either the labial or lingual sides of the two teeth.

If the metal is formed to the lingual side of the teeth and the wire is also arranged on the same side, the ends should extend over the coronal surfaces to the labial side, and each be formed into an independent clasp to encircle the separate teeth, or the wire can be arranged on the labial side as described, for attaching it to a single tooth.

Dr. W. H. Jackson, of Ann Arbor, Mich., recommends a crib spring wire attached to a plate, and passing over one or more teeth on either side of the arch for retaining obturators, and thus avoiding the ordinary injury to tooth-structure. (See *Ohio Journal of Dental Science*, Vol. XI, page 134.)

The advantage of using the crib appliance for young patients is that it is easily retained, causes no inconvenience, and does not interfere with articulation, even when used in the upper and lower arches at the same time.

The model is not injured in making the appliance, and may be preserved as a record for future measurements and study.

By attaching the appliance to a single tooth on each side of the arch as an anchor, all of the other teeth tend to support it, and thus, in ordinary cases, the same object is gained as when more teeth are used as anchorages.

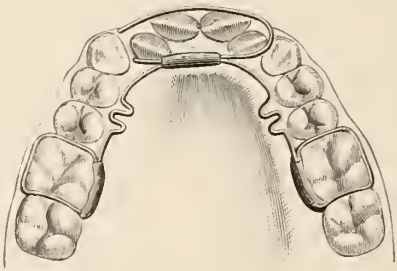
Where one or two incisors are erupted posterior to the natural

position in the line of the arch, with, as is often the case, the first temporary molar, or bicuspid, decayed or absent, an appliance like Fig. 5 will, if the teeth are not too crowded, be sufficient to correct the irregularity. It is made of spring wire, about No. 17 to 20 standard wire gauge.

Fig. 5.

A loop is first made to pass through the space with one end following the lingual and the other the labial curve of the arch, and extending to or a little beyond the teeth to be moved. The spring on the labial side is usually made a little longer than the one on the lingual. The appliance is retained by placing a collar with a lug in suitable position on one or more teeth. If the power of the spring is found to be insufficient, a wire of larger size can be substituted, or a silk ligature

Fig. 6.



be looped around each wire near its end, and by passing between the teeth cause additional pressure by drawing the springs together.

If all the teeth are erupted, and none are to be extracted, the appliance described can be made efficient by bending the loop at a right angle with the springs, and by suitably shaping it to lie over the arch

at the junction of two teeth. This is easily accomplished by placing the loop in a flat-nosed plier or a vise and bending at once to the required angle, being careful to have the loop so shaped as not to interfere with the closing of the teeth, and to retain it with gold collars and lugs on the teeth as previously described.

If the arch is much crowded and some of the teeth too prominent or requiring to be rotated while at the same time expanding the arch, an appliance like Fig. 6 will often be required, and in addition to the appliance described a base wire should be anchored either to the second temporary molar, second bicuspid, or first permanent molar on each side of the arch, and provided with one or two loops or corrugations, just anterior to the crib attachments. The loop-shaped spring is then united to the base wire by one of the methods previously described. To expand the arch, the loops or corrugations in the base wire are opened slightly from time to time, and the loop in the spring over the incisors changed to meet the indications.

If the lower incisors are crowded, and especially if they are held back by the position of the superior incisors, and their position is such as to require the whole or part of the arch to be expanded, an appliance like the one shown will, in many cases, meet the requirements. The base wire in this instance is made with a loop in the center just posterior to the central incisors, and anchored to a tooth on either side of the arch as described. A spring is then attached to the base wire just anterior to the crib portion on each side in the usual manner, and extended forward to the lingual surface of the teeth to be moved. A collar with a lug is often placed on an incisor or other tooth to steady the spring. The pressure is controlled by opening the loop and bending the springs outward.

Fig. 7 exemplifies the method employed to force into line a left superior lateral incisor that was far inside of the arch and out of proper position. At the same time the arch was to be spread to some extent. A crib was formed about the first bicuspid on each side of the arch, and to the crib was soldered a base wire that was shaped to the curve of the lingual surface of the teeth. A spring was then fastened to the base wire near the right bicuspid and extended forward, forming a spring which passed beneath a lug soldered to a collar on the lateral. The same system was employed to move a central incisor out into line, the crib being attached to the temporary molar. In each case the teeth were moved into position in a very limited time.

It often occurs that all of the superior incisors bite over the inferior incisors excepting one (either a central or lateral). If the teeth are not

crowded, and there is no necessity for expanding the arch, a collar having an eyelet or tube soldered to the labial surface can be placed about the tooth that is to be brought forward. A spring wire is then formed into a loop, the ends extending parallel, with one twice as long as the other and curved toward the shorter one, and also curved

FIG. 7.

back sufficiently to follow the labial surface of the teeth in the arch (Fig. 8). The longer spring should at least be long enough to cross the surface of three teeth. The shorter arm is usually applied next to the gum, and is bent slightly outward before being placed in the eyelet or tube.

FIG. 8.

FIG. 9.

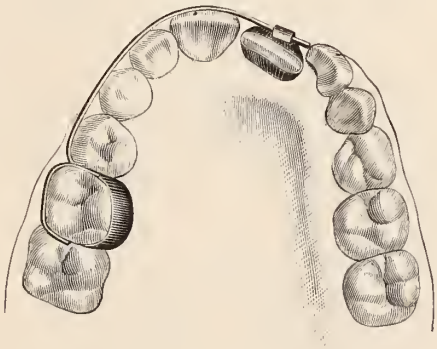
In adjusting the appliance the longer spring should be next to the gum, while the end of the shorter one is being inserted in the tube; then by turning it downward the whole appliance comes into proper position, with the shorter arm of the loop acting as a spring to draw the incisor outward (Fig. 9). The spring is removed easily to put

on more pressure, and usually requires no other means of retaining than the tube on the collar.

In Fig. 10 it will be seen that the right superior incisor is too prominent and the left incisor not prominent enough, and is partially rotated. The irregularity was corrected by making a crib with which to clasp the second right superior temporary molar. A spring extended from the crib to the front of the arch, following the labial surface of the teeth near the gum line, and was formed to pass the right incisor and to extend into a tube soldered to a collar placed on the left incisor.

By removing the appliance and slightly straightening the end of the spring, pressure was exerted on the front of the right incisor, forcing it back into line, and acting at the same time as a lever it drew forward sufficiently to move the left incisor into line, and also to rotate it.

FIG. 10.



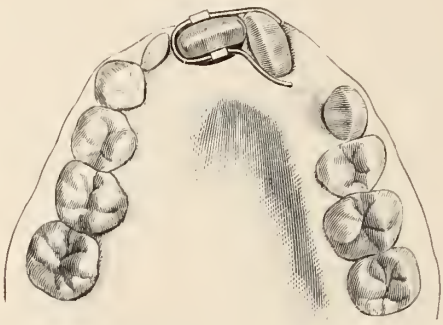
The same method has been used with marked success for rotating teeth, making the crib portion either with the partial clasp soldered to the end of the spring, or with the end of the spring formed into a simple crib, to pass over a bicuspid or molar, with the other end of the spring portion extended into a tube or eyelet in the band about the tooth to be rotated, being careful to bend only the end of the spring where it enters the tube, when more pressure is required.

A very simple and effective method for rotating into proper alignment one or more central incisors that are fully or only partially erupted is to place a collar on one or both, with suitable lugs attached to hold a U-shaped spring wire, having one arm extending on the labial side of the teeth, and terminating in a curve so as to cause pressure on the mesial edge of the left central, and at the same time serve to keep the appliance from slipping laterally. The other arm on the lingual side

is curved forward somewhat in the center, and its end left long enough to extend a little beyond the distal side of the left central. (Fig. 11.)

In the case illustrated the patient was but seven years old, and the temporary laterals were absent. But if the laterals are present the

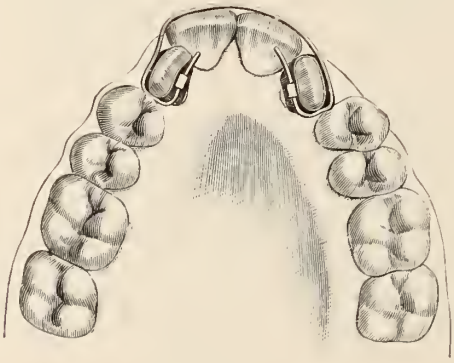
Fig. 11.



wire should have a loop so formed as to pass over the arch at the junction of the lateral and central incisors as described in Fig. 5.

If the incisors of the superior or inferior arch are inclined to the V shape, or the laterals are somewhat back of the normal line of the arch,

Fig. 12.



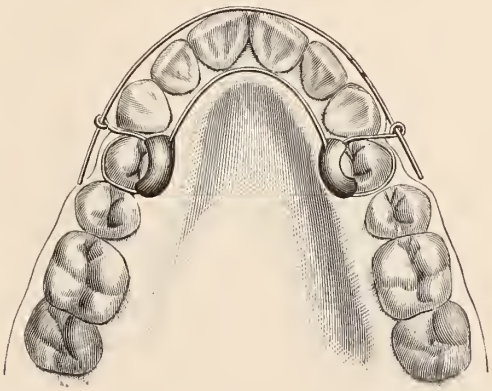
and the rest of the teeth in proper position, a spring as shown in Fig. 12 will usually be sufficient to correct the irregularity. A spring is formed to extend across the labial side of the incisors to the distal side of the laterals, with its ends forming a loop and passing over the arch to the lingual side, and bent again at a right angle to follow the lingual

side of the laterals and extend onto the outer third of each of the central incisors. It is usually retained by placing collars with lugs on the laterals.

It will readily be seen that by removing the spring, straightening the main portion slightly, and replacing it, there will be a pressure backward on the mesial portion of the centrals and a corresponding drawing forward of the laterals to rotate them and the centrals at the same time. Such appliances can be used for rotating the centrals alone in the same manner.

Fig. 13 shows a very convenient method of regulating the V-shaped arch, by forming a base wire (with or without a loop or corrugation), which is shaped to the lingual side of the teeth, and anchored to one or

FIG. 13.



more teeth on either side by a crib, to the labial side of which should be attached a hook or eyelet to sustain a straight bar of spring wire that is sprung over the front of the teeth for the purpose of flattening the shape of the arch. The tendency of the wire to straighten itself exerts a pressure backward on the front teeth, and at the same time assists in spreading the arch.

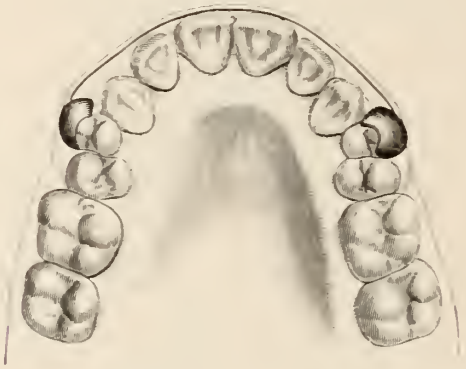
Since describing in the *Dental Cosmos** the method of drawing crowded incisors into proper line where a bicuspid had been removed on either side of the arch, a valuable addition has been made which facilitates the work. The foundation spring is made of heavy spring wire following the lingual curve of the arch, and attached by a crib to the teeth that are to be used as anchors, on the labial side of which are attached two independent springs on either side of the

* Vol. XXXII, page 875.

arch, one of which extends forward beyond the median line to act on the incisors; the other, or shorter one, terminates in a curve on the mesial surface of the cuspid, which will so be drawn backward. If only one spring is used on either side, it will often be an advantage to extend the wires beyond the median line sufficiently to press on the cuspid of the opposite side of the arch.

Drawing into line one or more prominent bicuspids or cuspids, whether partially or fully erupted, where partial space remains for them, can often be effected by fitting thin metal to the labial surface of the teeth to be moved, and extending the metal well toward the necks and distal sides of the teeth. Then shape a good-sized spring wire to follow the outline of the front teeth, and extend that to the metal clasps to which it is soldered. The appliance is removed from time

FIG. 14.

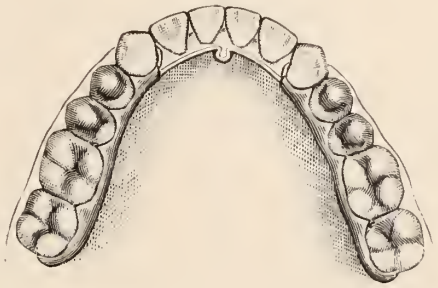


to time, and the clasping ends of the spring bent toward each other to exert the pressure required. (See Fig. 14.) A similar appliance was used for retaining the superior incisors and cuspids, that had been too prominent and were drawn back, the cuspids filling the space formerly occupied by the first bicuspids, which had been removed. In this instance a half-round gold spring wire extended from the labial surface of the front teeth back on either side of the arch and was anchored to the second bicuspid, the crib consisting of the partial clasp on the labial side and the spring wire on the lingual side of each respectively. The bicuspids had not moved forward perceptibly at the end of ten months, and the front teeth were perfectly retained.

It is obvious that an appliance for spreading the lower arch of teeth should not extend below the gum line, as the tissues are tender, and a covering plate is not tolerated without more or less rebellion,

especially if the arch is to be expanded to any extent. Indeed, there is no apparent advantage in extending the appliance onto the mucous membrane in any ordinary case, as the alveolar process will follow and surround the teeth in almost any position they are made to assume. An appliance like Fig. 15 may be easily constructed and will meet all requirements. After carving the model and arranging partial clasps of metal on the palatal surfaces of the teeth on either side of the arch, a spring wire with a loop in the center is formed to follow the lingual sides of the teeth in contact with the metals. Tin or solder is then used for soldering, as in the more simple case. It is not often necessary to retain this appliance by extending wires over the arch. The same system is applicable for contracting the arch, the moving force being developed by bending the spring inward or outward as the case may be.

FIG. 15.



The same system has been used successfully for retaining all of the teeth in the arch after regulating, by shaping thin metal to the labial and lingual sides of all of the teeth to be retained, after which a wire is shaped to come in contact with all of these. The two sides are next joined with small wires, passing over the arch as in the simple crib. Tin is then flowed over the spring and metals, joining them all. If the model is perfect and the appliance well constructed, a perfect adaptation is the result.

This retaining device will be of service in cases of simple fracture of the jaw. The metal clasps can be formed to fit a tooth as perfectly as an ordinary clamp. It can be made in sections and fitted to the teeth on either side of the fracture, and the two or more parts united after their suitable relationship has been found by the proper adjustment of the displaced tissues.

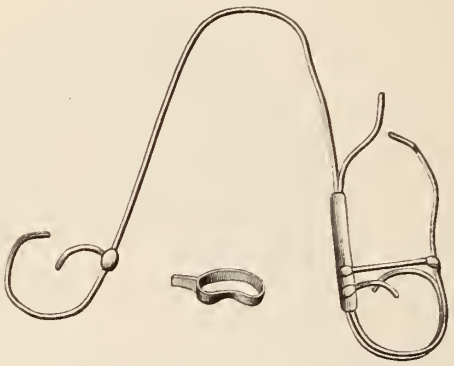
In a certain class of cases the following method has given satisfaction for drawing into line a bicuspid that has erupted inside or outside of the arch. A spring wire is bent in the form of a crib surrounding the

irregular tooth and an adjoining one on each side, passing well up next to the gum on the labial and lingual sides, with the ends of the spring wire terminating upon the tooth to be moved and free to cause pressure upon it. Fig. 16 is an example.

The model here presented represents the teeth of a young lady sixteen years of age. Both of the lower first molars have been extracted, and the second molars have moved forward and taken their place. The upper front teeth are too prominent, the laterals being rotated outward so that their cutting-edges are across the arch. The crown of the superior left cuspid is about one-third erupted, and is coming inside of the arch, as there is insufficient space for it to erupt in proper line. All of the removed teeth and the superior left first molar had been extracted by a practitioner who inserted a vulcanite plate

FIG. 16.

FIG. 17.



that covered the roof of the mouth and extended through the space made by the removal of the first molar, to form a clasp around the second molar, from which projected a metal point both on the labial and lingual sides of the tooth, for the attachment of four rubber rings which extended forward and were hooked over gold spurs that projected from a gold collar on the first and second bicuspids for the purpose of drawing them back to make room for the cuspid and lateral incisor. The appliance was well adjusted, but as the molar was very short it was not well retained.

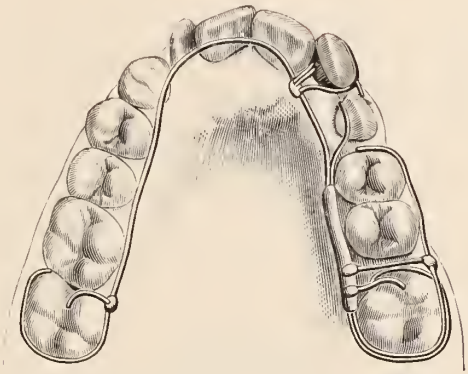
The patient was referred to the writer, and a crib made in the following manner was inserted December 20, 1890.

A base wire was formed of No. 17 spring wire to follow the line of the lingual side of the teeth, its ends formed into clasps which extended nearly around each of the second molars. A long U-shaped

spring was then placed on either side of the left second molar and bicuspids, the ends extending in front of the first bicuspid on either side. The two wires were connected in front of the molar by a cross wire having its ends flattened and curved around the two wires, which were also wound with fine binding wire, and all soldered with soft solder, using a soldering iron.

The inner spring end was shaped to press on the partially erupted cuspid to force it outward into place. The outer spring end was given a curve against the mesial side of the first bicuspid, the action of which drew both bicuspids backward. The appliance was anchored to the second molar, and was prevented from moving forward by resting against the lingual side of the incisors. (See Fig. 17.) One result is shown in Fig. 18.

FIG. 18.



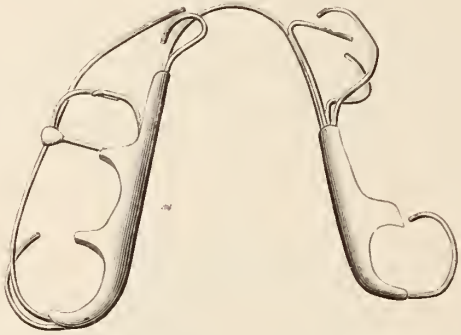
A new appliance was then constructed to retain the teeth that had been moved. It was made with the partial tin clasps, contoured, and united to the base wire with solder as previously described.

Both laterals were to be rotated inward, and, as the teeth were very prominent, the second bicuspid on the right side was extracted, and the first bicuspid and cuspid were moved back by springs as described for moving the bicuspids on the left side. At the same time springs were added to the appliance for rotating the laterals, the principle of which was to attach a spring with a straight portion in contact with the lingual side of the tooth, and a spring attached to the base wire which extended in a curve to the labial side of the tooth. (See Fig. 19.) By gradually changing the angle of the springs, the teeth were rotated into proper position. (See Fig. 20.) The appliance was well retained, and additional springs were added as needed until there were nine in all. A complete retaining appliance was applied May 21, 1891, the

space made by the removal of the bicuspid being almost entirely closed, the projecting incisors brought well inward, the arch made symmetrical, and the appearance of the patient remarkably improved.

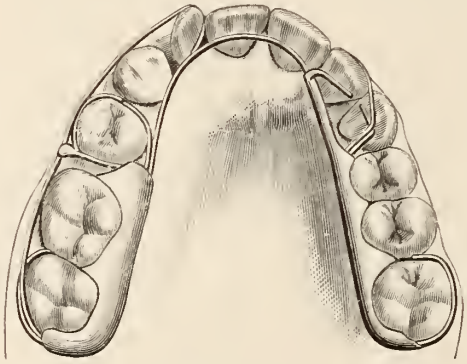
Respecting this entire crib and spring wire system, special stress is laid on the following facts: (A) The materials—piano wire, tagger's

FIG. 19.



tin, sheet copper, copper wire, tin, and soft solder—are inexpensive, and within the reach of all. (B) The crib and spring construction is simple and quickly done. (C) The clinging grip of the crib on its anchorage is sufficient to hold the fixture firmly, yet it is easily sprung off for cleansing or change. (D) Changes or additions are easily and quickly

FIG. 20.



made. (E) The structure is light, cleanly, and occupies the least possible space in the mouth. (F) Its action is controllable, and free from risk of overaction. (G) It forms a perfect retainer.

Therefore its general adoption may reasonably be anticipated as soon as these facts shall have become known.

SECTION III.—Continued.

Operative Dentistry.

Report by N. S. HOFF, Secretary of the Section.

IN planning a report which would in a comprehensive way outline the status of operative dentistry, we turn to the periodical literature of the past year for data ; and we are surprised to find that the literature bearing upon this subject in its several departments is so varied and extensive that a brief synopsis only of all that has been written or said in discussion and published would make a report too tedious and uninteresting to inflict upon this body.

We shall therefore content ourselves with a very brief *résumé* of a limited number of references to articles and items which may, we hope, indicate the tendency of thought and activity toward unification or consolidation of the principles underlying practice, and especially to such as appear to be likely to modify future methods.

As we have read through the contributions to the various local societies and to the journals, we have been struck with the fact that frequently the discussions—usually impromptu—following the reading of a paper develop the most practical ideas, emphasizing and sometimes modifying the ideas of the author to such an extent as to transform an indifferent paper into one of great value. The thought occurred to us, Why could not these local societies supply to this society a condensed abstract of all meritorious papers and the discussions, to be referred to the proper Sections, and from there distributed in print to each member of the Section for criticism, to be then presented at the annual meeting before the entire society, in an epitomized form, for final discussion? In this way this society would be supplied with important material for the consideration of this body; the discussion would be systematic, and because of thoughtful advance preparation by the best minds of the country the original paper would

be given such attention and prestige as would stimulate members of local societies to better efforts and induce the societies themselves to send us their choicest productions.

During the past year a great deal has been written and published on the mere manipulative division of our subject. But it is gratifying to note that methods of practice are not now received so much as formerly on the mere dictum of some popular man, but they are made to undergo scientific scrutiny before any credit will be allowed, and consequently fewer serious mistakes are made.

Probably the most notable contribution to our periodical literature this year has been the series of papers contributed to the *Dental Cosmos* by Dr. G. V. Black, on the "Management of Enamel Margins." In these papers, which probably contain no new methods of preparing cavities or of introducing the filling-material, scientific reasons are given for methods that are familiar to every practitioner, and which he has worked out for himself by actual experience at the chair through long years of experience, too often at great cost not only to himself but to his confiding patients also. We feel assured that experienced practitioners will read these papers with a feeling of pleasure, and with that renewed assurance that comes from reasonable consciousness of a scientifically correct basis of action, and we are confidently justified in predicting a higher degree of attainment and uniformity in methods of practice. May we not hope that these papers will also have a useful mission in assisting younger practitioners, or at least in warning them against the costly mistakes of their predecessors?

We would earnestly commend these papers to the careful consideration of the profession, believing that they mark an era—possibly not its beginning—when the practice of operative dentistry shall be placed upon a true scientific basis, proved and demonstrated by the inflexible laws of nature, and when its teaching shall be more settled and uniform.

Another interesting paper, entitled "The Preparation of Teeth for Filling," was read at the Illinois State Dental Society by Dr. Edmund Noyes, which elicited a prolonged and profitable discussion. Papers on "The Treatment of Proximal Surfaces," by Dr. George A. Wilson and Dr. W. H. Dwinelle, have caused an interesting discussion in the New York Odontological Society on the formation of cavities for gold fillings, contour and face fillings, etc., and in other less noted societies and in journal articles the subjects of separations, anchorages, retaining-pits, inlays, etc., have received an unusual amount of attention.

Another indication of the permutation going on at this time in connection with this phase of our subject may be gathered from a paper read before the Maryland State Dental Association by Dr. C. M. Gingrich, in which the author takes the position that cohesive gold does not possess as many advantageous properties as non-cohesive gold for a filling-material. The interest and value of the discussion which followed lies in the fact that the participants were largely, if not wholly, educated in the non-cohesive methods, and long years of practice give to their statements singular interest, especially as it appears from a careful review of the discussion that the author's statement is not wholly confirmed, but that the practice of strictly non-cohesive filling is passing away, and that the intelligent practice of to-day embraces all materials singly or in combination and all methods of practice that are reasonable and exact.

The combination of gold and tin continues to claim the favorable opinion of the profession. Some new features in the working of and the nature of this material were brought out in a paper read last year before the Southern Dental Association by Dr. W. D. Miller, and in the discussion following. This material seems to have come to stay, and is rapidly taking the place of other inexpensive and easily applied filling-materials because of its comparative reliability.

From a careful examination of the literature of the year, we feel that we are justified in making the statement that tin and gold in combination is more favorably received and used than any of the plastic materials.

Copper amalgam, which three years ago seemed to promise so favorably as a durable and therapeutic filling-material, has so disastrously failed that it is now used with misgivings and unusual precautions by its former advocates, and it is severely condemned from almost all sections. Its failure results in a gradual wasting away of the material in the tooth, from supposed chemical or electrolytic action taking place in the material itself because of the presence of an abnormal condition of the saliva. Dr. W. B. Ames read a paper at the Mississippi Valley Dental Association, in which he claims that this wasting away of this material is due to an imperfect amalgamation of the copper. He also claims that, "with copper amalgam in which the copper precipitate has been carefully amalgamated," and the amalgamation has not been disturbed by heat or grinding, we have a material that will have permanency and stability in the most acid mouth.

Considerable has been written advocating the use of gold in combination with cements and gold with amalgam, the claims being that

the adhesive quality of the cement will assist in securing an anchorage in frail teeth, without undercuts that would sacrifice tooth-substance which it may be desirable to retain for support or esthetic reasons ; also to prevent encroachment upon the pulp. The principal claims in the use of amalgam and gold are that difficult cavities are readily and securely filled, the amalgam at the cervical border or at the bottom of the cavity acting therapeutically, and the gold which is built onto the crown forming a perfect surface, enduring, esthetic, and closely adapted to the enamel margins. Dr. J. E. Cravens has used a thin section of gutta-percha to make the joint under gold fillings at the cervical border. While he has only used the method not quite one year, he is convinced that it is a valuable proceeding.

In the January, 1891, *Dental Cosmos*, Dr. W. D. Miller presents the results of his research in regard to oxyphosphate cements, in which he concludes that they should be used with caution as pulp-cappings, always with some non-irritant dressing intervening. They cannot be depended upon as pain-obtundents, to support weak walls of enamel, or to make water-tight joints ; and because of their sticky nature and indifferent antiseptic qualities they are inferior to oxy-chlorides as pulp-canal fillings.

We are pleased to note, judged by comparative silence on the subject, that the subject of immediate root-filling has almost become one of the lost arts ; and the fallacious and too common opinion of only a year ago, that a pulp once fully denuded of its natural covering could not be artificially protected and its function preserved, is giving way to the more rational idea of conservation.

In the February, 1891, *Dental Cosmos* is to be found a paper on the subject of "The Destruction of the Dental Pulp, and Methods of Treatment of Teeth Discolored by its Retention in the Pulp-Chamber or Canals," by Dr. A. W. Harlan. The treatment is unique and rational, but would require too much time to present it in this report. We can, however, most earnestly commend it to the thoughtful consideration of this body.

In the treatment of the ordinary diseases of the teeth and their surroundings nothing special has appeared during the year to mark any special advance, except reports of cures of individual cases by well-known processes or agents.

Some new remedies, principally of the antiseptic class, are worthy of our notice.

Aristol, a composition of iodine and thymol, has come to rapid favor as a substitute for iodoform, it being equally, if not more efficacious,

and with none of its offensive odor. Dr. E. C. Kirk has an admirable article in the July, 1891, *Dental Cosmos* on its use in pyorrhea alveolaris, alveolar abscess, root-canal dressings, etc.

Trichloride of iodine is another probable candidate for favor as a germicide. Dr. Miller predicts it will prove as good or a better germicide than bichloride of mercury, and much less poisonous.

Aquozone is a new antiseptic preparation, made by forcing ozone into distilled water containing a small percentage of hypophosphites and phosphates, these salts serving to absorb the ozone and make the preparation a fairly stable one. Dr. C. F. W. Bödecker has used the preparation with very gratifying results in the treatment of necrosis and other diseases where the peroxide of hydrogen is now used. The advantages claimed over peroxide are : a more stable preparation, contains no acid, and one which will not become acid, is harmless, and is an excellent germicide.

Pyoktanin, or methyl-violet aniline, promised to be a very effective antiseptic, but clinical use of it has proved its insufficiency, and its disagreeable staining property has excluded it from operative practice.

Of books that have appeared the past year that are of interest to our specialty, we desire to call attention to the following :

Micro-Organisms of the Human Mouth, by W. D. Miller, D.D.S., M.D.

Compendium of Practical Dentistry, by B. H. Catching, D.D.S.

A Compend of Dental Pathology and Dental Medicine, by Geo. W. Warren, D.D.S.

A Treatise on the Irregularities of the Teeth and their Correction, by J. N. Farrar, M.D., D.D.S.

Descriptive Anatomy of the Human Teeth, by G. V. Black, M.D., D.D.S.

Dental Surgery and Pathology, by Henry Sewill, M.R.C.S.

At the meeting of Section III last year it was decided to divide the work of this Section for report into its several departments, and have a report made on each of these departments by some one especially interested in the work given him.

We have, accordingly, to ask your attention to the following subjects : "The Correction of Irregularities," by Dr. V. H. Jackson. "Treatment of Children's Teeth," by Dr. J. Y. Crawford.* "Local Anesthetics and Pain-Obtundents," by Dr. L. E. Custer. "Art *versus* Nature," by Dr. C. N. Johnson.* "New Instruments and Appli-

* For lack of time the papers of Drs. Crawford and Johnson were not read, and were withdrawn by them ; consequently they will not appear in the Transactions.

ances," by Dr. A. W. McCandless. In addition we also desire to present, through Dr. C. N. Peirce, a communication, with illustrations, of a combination cement and gold filling.

We also desire to call attention to the low-fusing porcelain for use in making inlays and faces for metallic crowns, as brought out by Dr. C. A. Timme, of New York, as giving promise of advancement in the process of inlay fillings.

SECTION III.—Continued.

Dental Instruments and Appliances.

Report by A. W. McCANDLESS, of the Section.

IN looking over reports of various Committees on Dental Art and Invention as made to their respective State or local societies, I read, "The year has not been prolific of new appliances." Therefore I present this paper with some trepidation, for several things new to me have attracted my attention, and I am inclined to judge from the drift of these reports that I am behind my brethren in learning of these things. There are a few others which I have used with such peculiar satisfaction in my practice for the last year or more that I wish also to call your attention to them, so that if any of you have not made use of them you may possibly learn something to your benefit.

There are many kinds of matrices, but the one I prefer to all others for plastic fillings is the Ladmore-Brunton clamp and matrix, its chief claim to superiority being, in my estimation, the easy manner of its removal without disturbing the filling. The best matrix for gold is the Fletcher, invented a few years ago by Dr. Fletcher, of Portage, Wis. It is somewhat similar to the Brophy matrix, but better, because, instead of the band being made of one piece of metal, there are two, so that when the matrix is drawn tightly around the tooth it will adapt itself to the shape of the tooth, no matter how bell-shaped it may be, thus permitting of good contour and good edges at the cervical margin. The Marshall matrix is a very desirable one in some respects, and is comparatively new.

Dr. Keefe, of Chicago, has recently brought to notice a new cervical clamp which is the best I have seen. When adjusted there is nothing in the way of the operator, and for labial cavities extending to

and above the free margin of the gums, and even for buccal cavities in the bicuspids, it is the clamp *par excellence*, according to my judgment.

We have long been looking for a good sand-paper disk-holder, and I rather imagine that Dr. Rowe, of Albany, is the pole horse up to date. I have used his invention for a few days, and for rapidity of adjustment I believe it excels all others, with the possible exception of some sent me by Wm. M. Speakman, of Philadelphia, a year or more ago, which consisted of a cap and two flanges which fitted into parallel grooves on either side of the enlarged head of the shank. The cap also had a post in the center, to guide the disk and cap to the proper place. He attempted to improve on this by making a smaller and neater article, and thereby destroyed its utility.

Dr. Kimball, of New York City, has a new disk-holder to which a disk may be adjusted in a very short time, the only objection being that it is not universal in its application, as it takes a disk peculiar to itself.

Dr. Kimball has devised a very simple and useful waste-pellet receiver. Also a lip-protector, which may often be used to your own advantage and to the patient's comfort.

Dr. Faught has brought out a new dental electric heater, and points for gutta-percha which are truly convenient and serviceable.

The Secretary of our Section called my attention to a new dental engine called the Thomas Dental Electric Engine, which I had hoped to show you, but the inventor was not able to finish one in time. I have here photographs of the engine, which will give you some idea of its construction. It is attached to the ceiling and works on a ball and socket joint, permitting considerable range of motion. From the ceiling depends a shaft, and to the lower end of this the ordinary cable and sleeve are attached.

Dr. Gilmer's electric root-drier has been before the profession long enough to speak for itself, and is certainly a desirable adjunct to any well-regulated dental office.

The Davison separator is comparatively new, and fills a useful place.

The S. S. White Dental Manufacturing Company have recently given us what they term a revelation in burs. They are a great improvement on any heretofore brought out, in that they now cut on the end as well as on the sides.

Dr. E. Parmly Brown has something new in asbestos phosphate dentoplast and in asbestos chloride dentoplast.

Absorbent cotton rolls are new, and come in for their share of atten-

tion, as they are in very desirable form for closing the salivary ducts, and are especially effectual in excluding moisture from teeth or roots in setting crowns.

A glass mixing tablet for cements, with rubber feet, is new and very convenient. Flexo files are good, being pliable and not apt to break, and having remarkable cutting-power.

We have something new and good in enamel fissure-burs which cut rapidly. We have also a new and improved copper amalgam heater.

Dr. E. P. McLean, of Boston, gives us something new in bur-sharpeners, being large-sized sand-paper disks supported by tin-plate disks.

Dr. Teague, of Aiken, S. C., has some new capsicum plasters and cavity cap disks, the latter of metal lined with asbestos, and intended for capping pulps.

Dr. J. L. Mewborn has an arrangement to be attached to the mechanical mallet, and operated by the assistant by holding against the end of the hand-plugger, thus giving to the operator the benefit of a blow for his hand-plugger similar to that of a hand mallet, with the advantage of a very rapid stroke. Dr. Mewborn makes great claims for this. He claims that since he began using this he has almost no need for rubber-dam, as the fillings are so rapidly inserted.

SECTION III.—Continued.

Obtundents and Local Anesthetics.

Report by L. E. CUSTER, of the Section.

WHEN asked to make the report upon Obtundents and Local Anesthetics, it was desired that since no such report has been recently given, it should cover more than one year.

In reporting obtundents of sensitive dentine, it will not be necessary to go back farther than the revival of sulphuric ether for this purpose, which marks the beginning of what has become the fad at present of using volatile agents. Where formerly the operator endeavored to obtund sensitive dentine by the application of some medicament in the cavity or by thoroughly drying it, it has become quite popular to-day to do so by spraying some vaporizable agent or combination of agents upon the dentine.

Sulphuric ether was introduced by Dr. Ottolengui in 1888. Although this was not the first time this was used for this purpose, the broad claims made for it were effective in turning the attention of others in this direction, which has resulted in the introduction of some new and valuable agents. The ether used is the ether for anesthetic purposes. After dehydrating as well as possible by hot air and alcohol, it is applied by means of an atomizer or any spray appliance which will throw it in an attenuated form upon the dentine, where it volatilizes. The effect of this rapid volatilization is to abstract the heat from the tooth, and if applied long enough the dentinal fibril will become completely benumbed. This, as would be expected, causes pain at first, which gradually diminishes. When the pain has ceased, excavation may be proceeded with until sensation is restored by the return of warmth.

Up to that time, except the application of arsenic or a like agent

which resulted in the death of the pulp, this was the only method which could produce complete anesthesia of the dentinal fibril and the pulp live ; yet if the temperature be reduced too far, even this kills the pulp, which shows that it is on the border-land between the safe and unsafe agents, and is only to be used in extreme cases, and then with care.

Following the introduction of the ether spray, Dr. Otto Arnold suggested the use of a spray of nitrous oxide for this purpose, but this did not receive attention until Dr. Curtis read a paper and exhibited an appliance for its use before the New York Odontological Society in 1890. Ether volatilizes at 96° F., and nitrous oxide at 148° below zero ; and since the intensity of cold is in proportion to the rapidity of volatilization, it is apparent how powerful an agent we have in nitrous oxide. The enormous pressure necessary to keep the agent in the liquid form necessitates a very strong tube for conveying it to the mouth,—so strong that it becomes unwieldy. The appliance of Dr. Curtis consists of a rubber tube encased in a strong leather sheath, attached at one end to the cylinder and at the other a valve and a small nozzle. By this means the liquid is conveyed to the tooth, where it volatilizes, producing such intense cold that the parts are quickly benumbed.

There are three objections to the use of this agent upon sensitive dentine : the unwieldy apparatus necessary, the irregularity of the flow, and the danger of such a powerful agent. On account of these it will hardly come into general use.

In 1889, Dr. M. L. Rhein introduced chloride of methyl as a cold-producing agent. This is an ether having the formula CH_3Cl. The hydrocarbon radical is very low in the series, and for this reason we find it difficult at ordinary temperature to keep the methyl from passing into the gaseous form. Its boiling point is 73° F., while that of rhigolene is 64° F. We therefore have at our command an agent which is between ether and rhigolene, and which by the warmth of the hand volatilizes with sufficient force to form a continuous spray. It is capable of reducing the temperature to about 40° below zero, which gives it a range wide enough for all ordinary purposes. It has no affinity for water, and when used as an obtundent for sensitive dentine it acts purely by abstracting the heat.

It is furnished in liter cylinders, and with the proper valves and points it may be easily brought to play upon the tooth.

Its virtues may be summed up in the following : Volatilizing at ordinary temperature, it requires no apparatus for generating a blast,

as with ether. Since it is not a solvent of caoutchouc, it may be carried to the tooth through a rubber tube and its flow regulated by a thumb-valve. It produces more intense cold than ether, and on that account the pain following its application is brief and the obtunding effect of much longer duration. It therefore also requires less time to obtain the same results secured by ether. It volatilizes more rapidly, so that the adjoining parts are not covered with the agent.

The objections to chloride of methyl as an obtundent of sensitive dentine are that it is a general anesthetic, like the other volatile agents, and is very likely to be inhaled during the refrigerating process. It is also at the present time rather expensive. Altogether, it is all that Dr. Rhein has claimed for it as an obtundent, and is to be preferred as a cold-producing agent for sensitive dentine.

Chloride of ethyl is the last agent of this kind introduced. It resembles the methyl in many respects. It is a colorless ether, having the formula C_2H_5Cl, having, like the methyl chloride, an ether odor. It volatilizes at 50° F.

It is a French product, and comes to us hermetically sealed in three-drachm glass tubes, one end of which is drawn out into a fine point. This form readily commends itself. The directions for using are to "break off at the file mark." This will do if it is to be used as a local anesthetic, but I find that as an obtundent of dentine the opening at that point is too large. The ethyl issues in a stream large enough to flood the cavity, and it does not volatilize fast enough; whereas, if the point be ground off with a corundum disk about a quarter of an inch farther toward the end, the jet will be so attenuated that if held a little distance from the cavity it reaches it just as it is breaking up and is rapidly volatilizing.

The advantages of chloride of ethyl are similar to those of the methyl. It requires no apparatus for generating a blast. The form in which it is furnished us is neat and the usual size of dental instruments. It is effective.

While all the above-named are cold-producing volatile agents, on the other hand, and at the other extreme, there have been introduced heated air carrying a vaporized agent, and a jet of some agent which volatilizes above 98° by the aid of heat. As has been stated in the paper on the action of obtundents read in another Section, the action of these heating agents is essentially one of desiccation. Their virtue lies in the heat, and the vaporized agent conveyed is of no value unless it has an affinity for water.

The Small obtunder, the invention of Dr. Small, consists of a

cylinder with a heating bulb and proper points. In the cylinder is inclosed a cartridge containing absorbent material saturated with alcohol. The bulb is heated, causing the alcohol to vaporize when it is conducted to the cavity through a fine nozzle. This, on account of the heat, is painful at first, but the pain passes away, when the excavation may be proceeded with. The use of alcohol in this instrument on account of its affinity for water immediately recommends it.

The Milton obtunder consists of a chamber surrounded by a water-bath kept at blood-heat. In this vessel is contained the agent to be vaporized. Compressed air, after passing through a coiled tube also immersed in the water, enters the medicating chamber and carries the vaporized agent with it to the cavity of the tooth. Those agents like chloroform and ether, which volatilize easily, are contained in an outside vessel which communicates with the medicating chamber. This differs from the Small appliance by the use of a blast of warm air as a vehicle for the vaporized medicaments. The inventor says the oil of cloves, cinnamon, cajuput, eucalyptol, or thymol may be used, but recommends the following formula :

℞—Gum camphor, ʒ vi ;
Carbolic acid, ʒ iv ;
Acetanilid, ʒ i. M.

Since the temperature of this application is normal to the tooth, it will not be painful on application. The desiccation is not as rapid as when a higher temperature is used, and so it requires repeated applications. The apparatus is somewhat large and complicated, but these are compensated for by answering other purposes, such as keeping water and instruments warm.

The Richmond obtunder consists of a perforated cartridge containing cotton saturated with carbolic acid, oil of cloves, cinnamon, and wintergreen, equal parts. Compressed air passes through this, and, being heated, is charged with the volatilized compound. This gives results similar to the other two methods, except that it cannot be as effective, because the liquid used has no affinity for water.

Local Anesthetics.

New local anesthetics have not been as numerous as obtundents, unless it has been the multiplication of nostrums. Since the discovery of cocaine, there has been no local anesthetic *per se* of any value introduced. The only change has been in its combination with other agents. Nearly all the formulæ use cocaine as the base. The assist-

ant is the principal ingredient which varies. Chloroform, ether, alcohol, carbolic acid, antipyrine, aconite, chloral, etc., are often used singly or in combination as the assistant with cocaine, and to go into detail and give all the different formulæ in which cocaine is an ingredient would be beyond the limits of the report.

In regard to cocaine we are beginning to see that it is a dangerous agent, so dangerous that in France the dentist is not considered sufficiently qualified to administer it. A number of deaths have occurred from its use quite recently. This may be partially due to its combination with other agents—the compound may be chemically changed. The uncertainty of this agent, even when used alone, makes it dangerous, but where symptoms of poisoning from a combination of agents arise, the operator will be at a loss to administer the proper antidote.

Instead of using a four per cent. solution for injection, the tendency is to lower the per cent., and it is now quite the thing to use a two per cent. solution.

The number of local anesthetics recently patented is surprising, and when the composition of some of them is known it becomes alarming. One of the last good works of the late Dr. J. W. White was to utter a cry of warning against these nostrums. No person has a moral or legal right to inject into the circulation of a patient a substance the composition of which is unknown. As a rule these are formulated, as the proportions show, by persons of not very marked attainments, and when such people prescribe poisons for injection it is subjecting the patient to unwarranted risks.

Since the introduction of new refrigerants for obtunding dentine, local anesthesia by refrigeration has been revived. At the International Medical Congress last year bromide of ethyl was used by spraying it upon the side of the face from which the tooth was to be extracted, with apparently good results. Chloride of ethyl, chloride of methyl, and nitrous oxide carefully manipulated may be used for the same purpose.

With the revival of refrigeration, the object is not so much to benumb the tissue immediately surrounding the tooth as it is to diminish the neural activity of the nerve-branch supplying these tissues by spraying upon the face, but on account of the rapid circulation in these parts refrigeration cannot be as effective as the injection of cocaine about the tooth.

SECTION IV.

Histology and Microscopy.

Report by I. P. WILSON, Secretary of the Section.

IN the absence of Dr. W. X. Sudduth, Chairman of this Section, it devolves upon the Secretary to make this report.

Two papers have been referred to this Section: The first by Professor Carl Heitzmann and Professor Frank Abbott, of New York, entitled "Senile Atrophy of the Upper Jaw." The second paper is entitled, "Histological Methods and Results," by Professor L. C. Ingersoll, of Keokuk, Ia. This paper is a criticism of histological methods and teachings in their disregard of physiological function and clinical experience.

Owing to limitation of time, we reluctantly suggest that the paper of Professor Ingersoll be read by title,* and referred to the Publication Committee, and that the paper by Professors Heitzmann and Abbott, which will consume all of the allotted time, be read.

We are not aware of any marked progress in histological and microscopical research during the past year. But we are cognizant of this fact, that patient, untiring, self-sacrificing investigators are at work, and scientific advancement in some directions in this particular field of study may be expected during the coming year.

It should be remembered that we have faithful investigators in our profession who are spending their time, their energies, and their money at the expense of practice, and in some instances at the sacrifice of health, and that this burden is not in any way shared by the profession at large. We believe that ample provision should be made by this body for the encouragement and substantial support of these self-sacrificing laborers.

* Dr. Ingersoll declined to have his paper published unless it was read before the Association. It is therefore omitted.

SECTION IV.—Continued.

Senile Atrophy of the Upper Jaw.

Paper by CARL HEITZMANN of New York, and FRANK ABBOTT of the Section.

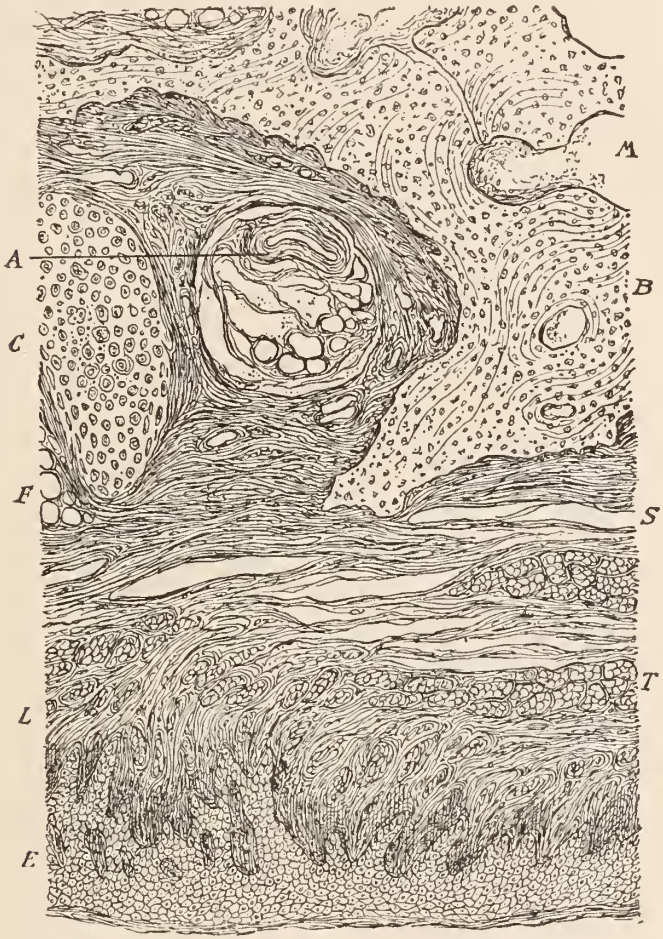
WITH advancing age the human organism is reduced in size and weight; the more so, as a rule, after the "threescore years and ten" have passed. The whole body shrinks, as well as all its individual tissues. Age itself is disease. The old Roman proverb says, "And the aged returns to childhood, both mentally and physically." The questions which we have tried to solve are, In what does this atrophy take place? What are its visible signs under the microscope?

Through the kindness of Dr. Emmons Paine, superintendent of the insane hospital in Westborough, Mass., we came into possession of the upper jaw of a woman, who died at the age of seventy-five years. The jaw, immediately after removal, was placed in a one-half of one per cent. solution of chromic acid, in which it remained for several weeks, for the purpose of softening the bony parts. We lay stress upon this fact, since previous researches upon senile bone have been made upon dried specimens, by which method we are convinced that the results of microscopical research must have been marred, if not rendered futile. The whole thickness of this jaw, from the oral to the nasal surface, was not more than from four to five millimeters; the oral surface was perfectly smooth, without a trace of a tooth or a socket. A slight indication of the central raphe could be seen. Vertical sections through it give striking pictures of far-advanced senile atrophy. (See Fig. 1.)

The stratified epithelium of the oral mucosa terminates in an almost even line without the least indications of previous gums, the sum total of the epithelium being considerably narrowed. The papillæ, so prom-

inent in the region of the gums in a normal condition, are still present, but considerably shortened and narrowed. The fibrous connective tissue is markedly reduced in its total quantity, as well as in the

FIG. 1.



ATROPHIED UPPER JAW. VERTICAL SECTION.—*E*, stratified epithelia of mucosa of oral cavity; *L*, longitudinal bundles of fibrous connective tissue; *T*, transverse bundles of fibrous connective tissue; *S*, spaces in connective tissue; *F*, fat-globules; *C*, hyaline cartilage; *A*, artery, probably in a previous alveolar canal; *B*, cancellous bone; *M*, Medullary space. × 50.

width of its bundles, as seen best in their transverse section. The connective tissue, including that of the previous gums and that of the periosteum, runs in an almost horizontal course, being interlaced by

bundles and tracts at an almost rectangular direction. It is traversed by numerous fissures, or slits, which were probably caused by mechanical injury in the process of cutting. This feature in otherwise perfect sections would indicate that the connection of the bundles is an extremely delicate one. Fat-tissue, so abundant both in the periosteal connective tissue and the medullary spaces of the cancellous bone of the jaws of the young and middle-aged, is extremely scanty. The bone itself produces only thin ledges bordered by an irregularly corroded line, without a distinction between compact and cancellous structure. The medullary spaces are greatly varying in size, and filled either with a delicate fibrous connective tissue, or with granular matter, probably disintegrated protoplasm. The most striking feature is the presence of portions of hyaline cartilage, at the same height with the bony tissues left, which goes far to prove that the cartilage has grown from a previous bony structure, and in a measure is replacing it. As is well known, hyaline cartilage is present in the lower jaw only at the earliest stages of embryonal life, up to the eighth week of development. Around and from this so-called primordial cartilage bone-tissue develops, and in the third month of intra-uterine life all vestige of cartilage is lost. How much hyaline cartilage has to do with the development of the upper jaw, we are unable to tell. Most anatomists consider the upper jaw as having sprung from fibrous connective tissue, in a way similar to that of all flat facial and skull bones. However this may be, it is certainly remarkable that hyaline cartilage should reappear in the upper jaw of the aged, proving, as it were, that advanced age is a recurrence of childhood, even to intra-uterine life.

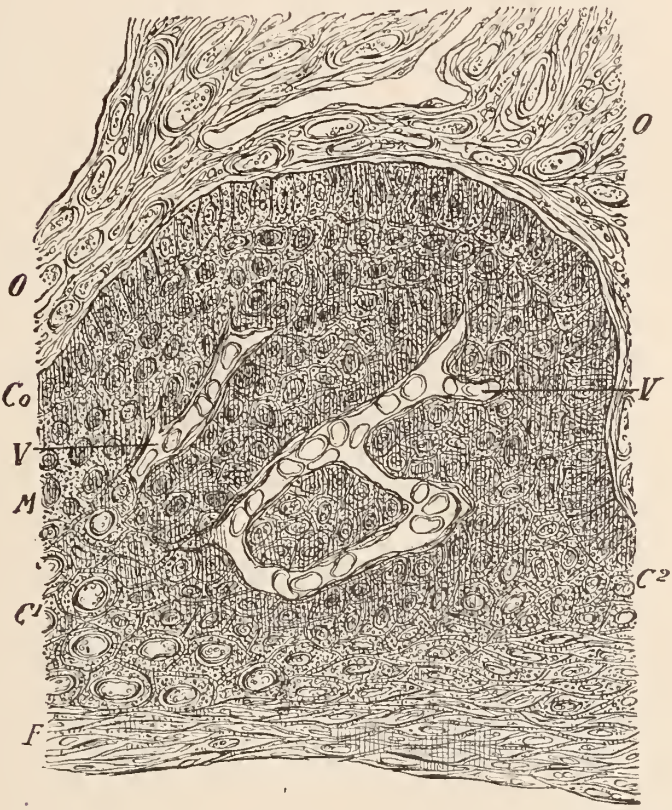
Let us now consider the senile changes of the tissues involved in the formation of the upper jaw.

1. *Epithelium.*—As mentioned before, the layer of stratified epithelium has been considerably reduced in bulk, although its three constituent portions are still recognizable, the main mass being made up of cuboidal epithelia, whereas the outermost or horny layer is composed of several rows of flat epithelia, and the border toward the connective tissue is established by a single row of columnar epithelium. (See Fig. 2.)

Horizontal sections through the mucosa show the thinning of the epithelial layer even better than vertical ones; in the former, also, the row of columnar epithelia is better marked than in vertical sections. Most of the epithelia are much less conspicuous than in childhood or middle age. This may be accounted for, first, by the fine granulation of both the protoplasm and the nuclei; secondly, by a reduction

in the amount of the intervening cement-substance; and thirdly, by a noticeable reduction of the bulk of each epithelium. An additional feature is that many of the original epithelia seem to have split up into smaller lumps. In many instances, only faintly-outlined nuclei are to

FIG. 2.



ORAL EPITHELIUM OF SENILE UPPER JAW. VERTICAL SECTION.—*F*, layer of flat epithelia; C^1, cuboidal epithelia with solid nuclei; C^2, cuboidal epithelia of small size, with small vesicular nuclei *M*, multinuclear layers of protoplasm; *Co*, columnar epithelium; *V*, *V*, capillary blood-vessels traversing the middle epithelial layer; *O*, *O*, myxofibrous connective tissue of oral mucosa. ×600.

be seen, so closely packed together that but little intervening protoplasm is discernible.

In many cases cement-substance is lacking altogether, to such an extent that the impression of multinuclear bodies is produced; wher-

ever cement-substance is present, though its ledges be ever so narrow, the delicate thorns traversing it are invariably traceable.

In some places, however, the nuclei of the cuboidal epithelia are almost solid glistening lumps, such as we are accustomed to see in either a juvenile or an inflamed condition of epithelium.

Broader epithelial valleys show in vertical sections narrow crevices, each holding a minute capillary blood-vessel. This may be explained by the shrinkage of previous papillæ ; though this view is hardly tenable in the face of the fact that all well-pronounced papillæ are supplied with a small number of blood-vessels. The view is more probable that capillaries with a little accompanying connective tissue have grown into the epithelial layer from without, thus causing, or at least assisting in, the atrophy of the epithelium.

This much is certain, that the reduction of the sum-total of the covering epithelium is caused mainly by a reduction in the size of each epithelial body. We are, however, unable to say where the lost material has gone, unless it was absorbed by newly-formed capillaries grown into the epithelial layer. A transformation of the epithelia, first into medullary corpuscles, and afterward into connective tissue, a process so common in inflammation and the formation of tumors, could nowhere be satisfactorily proven in our specimens, and seems to be little probable, since, as stated above, the columnar epithelia appear unbroken ; possibly mastication has been more or less instrumental in removing layer after layer of epithelia.

2. *Fibrous Connective Tissue.*—The senile changes of the oral mucosa are explicable only upon the fact, established by one of us in 1873, that the protoplasmic bodies lie between the bundles of the fibrous connective tissue, and the bundles themselves are not altogether inert glue-yielding basis-substance, but are traversed by an extremely delicate, almost rectangular, net-work of living matter. The bundles, therefore, are possessed of life as well as protoplasm itself.

Close around the epithelia, and in the remnants of the papillæ, we notice delicate bundles holding a large number of finely granular bodies, and but a small number of capillary blood-vessels.

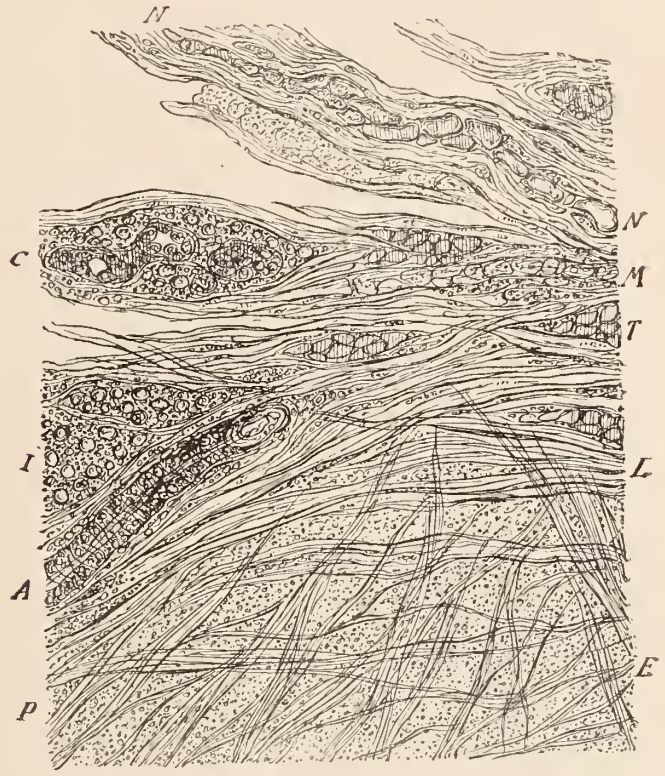
This tissue certainly differs from what we are accustomed to see in youth and in middle age. It may be termed myxofibrous connective tissue, such as is seen in tumors of the skin and mucous layers, termed myxofibromata. This tissue exhibits the same aspect, both in vertical and horizontal sections of the senile jaw. (See Fig. 2, *O*, *O*.)

The fibrous tissue proper is, as above mentioned, noticeable by the small size of its constituent bundles, as shown both in their longitu-

dinal and transverse sections. The changes of this tissue and its tenants, which are obviously the result of advanced age, are really surprising. (See Fig. 3.)

The bundles quite frequently show, under lower powers of the microscope, a faint granulation, which, if viewed with high powers,

FIG. 3.



ORAL MUCOSA OF SENILE UPPER JAW. HORIZONTAL SECTION.—*L*, longitudinal bundles of fibrous connective tissue; *T*, transverse bundles of fibrous connective tissue; *N*, *N*, medullated nerve-fiber; *A*, artery; *C*, capillary blood-vessel partly narrowed, partly obliterated; *M*, bundle of fibrous connective tissue split up into medullary corpuscles; *I*, cluster of indifferent corpuscles; *E*, elastic fiber; *P*, finely granular protoplasm. × 600.

proves to be the reticulum of living matter already alluded to. This goes to prove that the tissues, especially their matrices, or basis-substances, remain alive to the last. Some of the longitudinal bundles appear split up into faintly-marked medullary corpuscles, especially in their longitudinal sections (Fig. 3, *M*). Here, evidently, a slight

liquefaction of the glue-yielding basis-substance has occurred, leading, as it were, to a rejuvenescence of the bundle, *i.e.*, a reappearance of those embryonal corpuscles which in the earliest stage of development have built up the bundle. In other places clusters of glistening homogeneous globules make their appearance, scattered in a finely granular protoplasm. These globules are even smaller in size than the medullary corpuscles from which ameloblasts originate. (Fig. 3, *I.*) Nests of this description are similar to those seen in inflammation of the fibrous connective tissue, but we conclude are not inflammatory nests in our specimens, owing to their diminutive size and scantiness. There is no doubt in our minds that, exactly as in the process of inflammation, a recurrence of the juvenile or medullary condition has taken place. There is no doubt either that a liquefaction of the basis-substance has taken place in these nests, leading first to a reappearance of protoplasm, and afterward to an increase of the living matter thereof, up to the formation of the glistening lumps under consideration. The nests are still traversed by faint vestiges of the previous bundles, the same as we observe in early stages of inflammation.

The thinning of the bundles is unquestionably caused by their gradual transformation into protoplasm, since the interstices are found, in many instances, widened and filled with protoplasm of a finely granular character, which means a small amount of living matter. The ultimate fate of the bundles is, that the basis-substance is liquefied, and nothing is left but the framework of elastic fibers which have previously bordered the bundles, and which, on account of their chemical composition, are less destructible than ordinary glue-yielding basis-substance. (Fig. 3, *E.*)

The result is that where formerly dense fibrous connective tissue was present a faintly granular protoplasmic mass is now seen, the living matter of which is scanty and pale, apparently on account of a hydropic infiltration of the same. This will explain the flabbiness of the tissues of the aged on the one hand, and the gradual loss of living matter on the other. For we realize that particles of living matter with serum imbibed will be gradually detached from the mother soil, disintegrated, and taken back into the circulation through the scanty blood- and lymph-vessels left. The general shrinkage of the body thus becomes intelligible.

3. *Blood-Vessels.*—The fibrous connective tissue of the oral mucosa is, as is well known, freely supplied with blood-vessels—arteries, capillaries, and veins—during the ascending period of life, while it holds surprisingly few vessels in advanced age. In our specimens we

have a good opportunity to trace the manner in which the blood-vessels perish. Smaller arteries show in their muscular walls an augmentation of the nuclei to such an extent that the spindles of the smooth muscle-fibers become replaced by rows of minute glistening globules (Fig. 3, *A*). An artery may thus become so changed in its aspect that it were impossible to tell its original character, except through its attachment to a less altered artery of which it forms a branch. The endothelium of the inner coat likewise is enlarged and more or less crowded with coarse granules of living matter, by which means the caliber becomes at first narrowed and ultimately choked. The fibrous connective tissue of the adventitial coat behaves in a way similar to that of the mucosa generally, *i.e.*, it is gradually reduced to its juvenile or embryonal condition. After an artery has thus become impermeable to the current of the blood, it is in turn transformed into a solid tract of fibrous connective tissue, and as such is subject to the changes above described. The capillaries being composed of a single endothelial wall only, are easily traceable in their course to final obliteration. The endothelia swell up, become coarsely granular, and, by their bulging, the caliber is narrowed and rendered star-shaped. The augmentation of the living matter proceeds up to a complete occlusion of the caliber, such as is often seen in the process of inflammation. The result is a solid cluster of protoplasm in place of the previously hollow vessel. It seems that the nests of the glistening globules above alluded to are mostly present in the neighborhood of blood-vessels, or in places where blood-vessels had previously been. (Fig. 3, *C*.) Those who favor the emigration theory in inflammation must be at a loss to explain the appearance of indifferent or inflammatory corpuscles in places where the blood-vessels have perished. With us who urge the origin of such corpuscles both from the protoplasm—respectively its living matter and the living matter of the basis-substance—the images furnished by the microscope are explicable without any difficulty. That veins are gradually being obliterated in a way similar to that of arteries and capillaries is almost a matter of course, although we have not been able to trace this process directly in our specimens.

4. *Nerves.*—Here and there we meet with medullated nerves, recognizable as such by their course and their connection with other little or entirely unchanged nerves, which exhibit striking changes. Such changes are usually met with in the process of neuritis; but in this instance, neuritis not being present, they must be attributed to senile changes. There is nothing surprising in the similarity between inflammation and senile metamorphosis, since both are essentially a return

to the juvenile or medullary condition. Some medullated nerves appear to be broken up into glossy lumps, owing to a splitting up of the myelin; at the same time the parallelism of the contours is lost and the nerves show spindle-shaped widenings, alternating with narrow tracts. (Fig. 3, *N, N.*) The shining lumps are, probably at least transformed into protoplasmic or medullary bodies, which in turn are

FIG. 4.

CARTILAGE FROM SENILE JAW.—*M*, medullary corpuscles; *L*, small lumps of living matter; *B*, cartilage-corpuscles transformed into basis-substance; *G*, cartilage-corpuscles, partly coarsely and partly finely granular. 300.

transformed into spindles, and ultimately into fibrous connective tissue. Thus both the constrictions in the course of the nerve and the augmentation of the perineurium become intelligible, as well as the final loss of nerves, through their transformation into fibrous connective tissue. As to the changes of the axis-cylinders, we have nothing to say, since medullated nerves are unfit for the study of this particular portion.

5. *Cartilage.*—The appearance of hyaline cartilage (Fig. 4) in a

senile jaw is, as we have before remarked, a most surprising fact, going far to prove that rejuvenescence of the tissues takes place in old age. Hyaline cartilage is, no doubt, a transient or provisional tissue in early embryonal life, and the same seems to be the case in declining age, since it appears as a mere intermediate tissue between previous bone and the ultimate tissue, *i.e.*, fibrous connective tissue.

Hyaline cartilage in this case appears as a thin rounded-off plate, characterized by small and flat cartilage-corpuscles along the borders, whereas the central portions are made up of comparatively large and coarse granular bodies, if viewed with lower powers of the microscope. The borders of this tissue are intimately connected with fibrous connective tissue. (See Fig. 1, *C.*)

The basis-substance is everywhere scanty, and partly hyaline, partly finely striated. Higher powers reveal a surprising variety in the sizes and shapes of these bodies. From the smallest lump (see Fig. 4, *L*) there are transitions to large oblong corpuscles, mostly arranged in groups and clusters. (See Fig. 4, *M.*) The shapes vary from small globules up to large protoplasmic masses, flattening one another, where they are arranged like twins or triplets. Similar formations can be seen in almost any portion of normal cartilage, and such groups have been looked upon by histologists of olden times as striking examples of cell-division. Now we are aware that twin formations are visible in the earliest as well as in the latest formations of this tissue, and mean merely a grouping from the very origin, but no division. That the, comparatively speaking at least, active tissue should show lively division is beyond comprehension. Besides, how could the dense and tough basis-substance yield to make room for the rapid growth and division of cells? Since the fact is established that the basis-substance of hyaline cartilage is traversed by living matter, as well as the protoplasmic bodies themselves, the changes of the forms and sizes of the corpuscles are easily comprehended. Since the borders of the newly-formed cartilage exhibit small and finely granular corpuscles, we are justified in assuming that the corpuscles in this situation are at rest. The central portions, on the contrary, show coarsely granular bodies and clusters of medullary corpuscles, which seems to indicate that the latter part is breaking up into embryonal tissue in order to produce fibrous connective tissue, such as arises from a direct breaking up of bone-tissue. Intermixed with fully developed cartilage-corpuscles we meet those which show only a central nucleus or nucleolus, while the protoplasm is extremely pale, and differs from the surrounding basis-substance only by its slightly increased refraction. According to Spina,

these forms mean a gradual change of cartilage-corpuscles into basis substance, which view seems to be well founded.

Basis-substance originates in protoplasm, and may return to the protoplasmic state at any time. This tissue strongly supports the view of the changeableness of protoplasm, and as strongly contradicts the old-fashioned views of the stability of cells. A variety in the forms of cartilage-corpuscles, as we have just described, is seen in the transitional cartilaginous tissue known as "provisional callus" of shaft-bones.

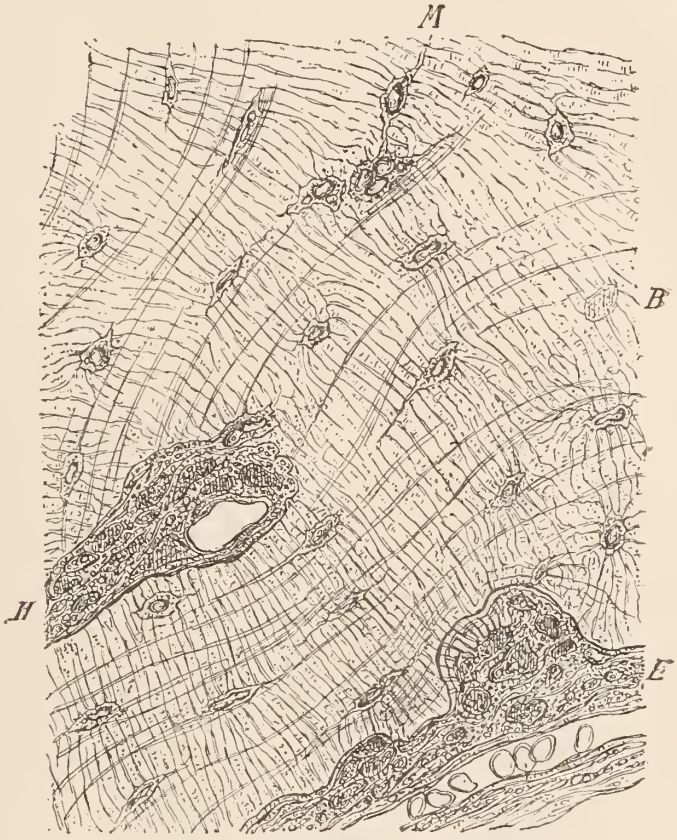
6. *Bone-Tissue.* (See Fig. 5.)—After individual teeth have been lost, their sockets, after a while, disappear, and after all the teeth are gone the whole alveolar process fades away. This process, so common, is known by the term "absorption," but we are not satisfied with the idea conveyed by this expression, for it is evident that a hard tissue like bone cannot be disposed of with so little ceremony. It would seem more reasonable to expect that it must first be reduced to its protoplasmic condition, which as such is more readily disposed of. The results of our studies in this case fully justify us in assuming that such changes do take place. Both the cortical and the spongy portion are much reduced,—the former, in some places, to a complete disappearance, the latter by a diminution of the bulk of its trabeculæ. The way in which this is accomplished is twofold. Firstly, the bone-tissue is attacked upon its periphery, through the attachment of the periosteum, and secondly, by an enlargement and new formation of Haversian canals in a previously perfectly-formed mass of bone. The borders are corroded, jagged, and amply provided with bay-like excavations, such as we see so frequently in the process of inflammation of bone. The bays usually contain protoplasmic bodies of varying sizes and shapes, but we have nowhere met with multinuclear bodies or giant cells, which Kölliker termed in a rather humoristic way "bone-breakers" or "osteoklasts." The origin of these medullary corpuscles is occasionally traceable from previous bone-corpuscles that have been deprived of their surrounding basis-substance. (See Fig. 5, *E.*)

Since in one connection the basis-substance is, though infiltrated with lime-salts, just as viable as are the bone-corpuscles themselves, we can readily understand that after a dissolution or liquefaction of the basis-substance protoplasmic bodies will reappear. The next stage is the elongation of the medullary corpuscles into spindles, and thence into fibrous basis-substance, with a simultaneous new formation of capillary blood-vessels.

The new formation of Haversian canals proceeds in exactly the

same manner as in osteitis, although on a much smaller scale. First a bone-corpuscle, or several neighboring ones, become enlarged by a liquefaction of the surrounding basis-substance. Next the living matter of such corpuscles increases in glistening homogeneous lumps.

FIG. 5.



SENILE CHANGES OF BONE OF UPPER JAW.—*E*, border of bone-tissue jagged and showing bay-like excavations; *M*, bone-corpuscles broken up into medullary tissue; *H*, enlarged Haversian canal; *B*, bone-corpuscles transformed into basis-substance. 800.

Some of the connecting canaliculi are widened into broad canals, the tenants of which increase in bulk. (See Fig. 5, *M*.)

Thus protoplasmic masses appear in a solid basis-substance, in which, by a hollowing of the living matter, new capillaries are produced, as one of us has described, in the process of osteitis, in 1872. An

already-formed Haversian canal is widening by continual melting down or dissolution of the adjacent basis-substance, with a gradual reappearance of embryonal or medullary corpuscles (Fig. 5, *H*), the ultimate destiny of which seems to be the production of fibrous connective tissue. This tissue at last is liquefied into protoplasm in a manner before described. In fact, the widened medullary spaces hold mainly such protoplasm, with but a few fat-globules.

An important question finds solution in the study of senile bone, viz: that of interstitial growth. Most modern histologists hold the opinion that bone-tissue grows by super-addition from without by apposition. A few writers, however, claim that bone may also grow by an increase of the basis-substance between the already-formed bone-corpuscles, which view seems to find support in the fact that the bone-corpuscles in old animals are farther apart than those in the young. Our studies enable us to account for this apparent interstitial growth as follows: It is a fact that with advancing age bone-corpuscles become fewer in number, the reason for which is that many of them are transformed into basis-substance, the same as Spina has claimed that cartilage-corpuscles are. Here and there we meet with a pale, finely granular bone-corpuscle without any vestige of a nucleus, and a refraction differing but slightly from that of the surrounding basis-substance. (See Fig. 5, *B*.)

Obviously a nucleated bone-corpuscle has changed into a finely granular protoplasmic body, which means an approach to glue, and subsequently to calcification. In looking over the tissue changes from the earliest embryonal life to the approaching physiological end of the individual, one must arrive at the conclusion that there is not for a moment absolute rest in the tissues; temporarily, single protoplasmic bodies may make their appearance, such as we see in odontoblasts and ameloblasts. Temporarily, tissues may come into existence, such as cartilage, which soon afterward is lost, or, speaking correctly, becomes transformed into other tissues. So long as life lasts, protoplasm and the tissues sprung therefrom are unstable.

All tissues arise from protoplasm, or its medullary or indifferent corpuscles, and all tissues return to this embryonal or medullary state before they are absorbed.

Origin and decline show a striking similarity, and what is between the "threescore years and ten" is struggle and change of the whole person, as well as of all its constituent parts, the tissues.

DISCUSSION.

Dr. Hunt : It seems to me that this paper is a very valuable one. So far as I know, this is the first effort that has been made to demonstrate the destruction or wasting away of bony tissue, in the same line of investigation that has formerly been taken up in regard to the softer tissues. It is well established, I think, in regard to the softer tissues, that the process of destruction of the tissue is a retrograde one, in full keeping with the process of formation. Now, this paper brings out the same idea as applied to bone-tissue. I have long been of the opinion that much of the investigation of this character was carried on more for the purpose of finding new laws, rather than endeavoring to find something like a universal law for the government of protoplasm and its action, both in building tissue and in tearing down tissue, and hence I think this paper is very valuable in that respect, and I presume it will lead to much more investigation in that direction.

Dr. Ingersoll : This seems like an effort on Dr. Abbott's part to teach us how to grow old gracefully. We who are getting along somewhat in years are very glad to find out some way of doing it scientifically, if not gracefully. I have been more interested in this paper of Dr. Abbott's than in any other I have read on histological subjects for many years. In the first place, it reaches a practical case which every operator is brought in contact with nearly every day. We wonder what becomes of the tissue of the aged when we see it wasting away. What is absorption? I believe we shall be obliged to come to this conclusion, that the same functions build up and afterward tear down tissue. We see in case of the absorption of the temporary teeth that the pulp first builds up the dentine-tissue, then in due time takes it down. Whatever the process may be, it is the same working organ in both instances. The presentation of the subject by Dr. Abbott shows us that the process of absorption is first a process of solution of the mineral portion of the bone, and then absorption takes place by the ordinary absorbing functions. The reverse is true in nutrition,—that is, after solid food is put in solution it is incorporated into the tissues. This is the vitalizing vitalization of nutrient elements.

I will take this opportunity to express my great dissatisfaction in another respect with regard to histological observations in general. When we are called upon to explain a fact, and to seek for that explanation by the microscope, microscopists have gone immediately

back to the embryonal condition. They teach too much from embryonic conditions, while we are dealing with matured and perfected tissue; and perfected tissue is a very different thing from embryonic tissue. The osteology of the matured form is not the same as the osteology of the infant. The brain-tissue of the infant is not the same as the brain-tissue of the man. How, then, can we understand the brain-tissue of the man from a microscopical observation of the brain-structure of the infant? Suppose I am a wood-worker. I want to know the nature of the oak I am working upon. I tell my microscopical friend I wish he would give it to me. He gets an acorn and analyzes it, and says, "Here is the oak,—this is the embryo oak." He gives me a complete analysis of that, instead of his observations of the structure of the matured wood. I want to know why the oak is a more enduring wood than the pine or the basswood or the cottonwood. I want him to give me the nature of the wood I am working, so that I can understand its peculiar qualities of strength and endurance. I cannot understand it from an acorn at all. I cannot understand the structure of the matured insect from observations of the chrysalis. I want something besides the chrysalis. I cannot know very much about the full-grown bird from a microscopical observation of an egg. I do not want the microscopist to give me the embryo—I want to see the tissue fully developed.

Here is a paper which, it seems to me, shows the value of the investigation of the matured tissue. We want more of that kind of observation. There is one thing I am not able to understand,—how it is, if the senile condition is a return to the embryonic condition, that the bone is so friable in old age compared to its condition in the embryonic state and in childhood. If there is a return to the cartilaginous condition of the bone, why is it that the bone is so fragile in old age?

Dr. Abbott: I will endeavor to answer that question. The bone-corpuscles,—of which there are many in the bones of young and middle-aged people,—as they grow older, the contents of the bone-corpuscles are converted into the embryonal state; that is, into little embryonic bodies,—medullary bodies, if you please. In time these bodies become infiltrated with lime-salts, which eventually fill the bone-corpuscle, which thus becomes, after a while, a section of bone, consequently friable as compared to what it was during the earlier period of life. It does not remain cartilaginous. The lime-salts are infiltrated into it and it becomes a portion of bone itself.

SECTION V.

Materia Medica and Therapeutics.

Electricity as a Therapeutic Agent in the Treatment of Hyperemia and Congestion of the Pulp and Peridental Membrane.

Paper by JOHN S. MARSHALL, of the Section.

ELECTRO-THERAPEUTICS in medicine and surgery has been developed to a considerable degree, and may be said to form a very large and important element in the treatment of certain forms of disease, while in dental surgery it has received but little attention ; in fact, it is almost a negative quantity in dental literature.

Its application, however, in dental surgery does not offer so broad a field for investigation, yet a study of its value as a remedial agent will be no less interesting than in other special departments of medicine, and when better understood it will, I believe, become an important adjunct to the means already at our command for the treatment of a considerable number of dental and oral diseases.

I have chosen as the special topic of this paper two out of several important pathological conditions of the teeth to which the various forms of treatment by electricity may be beneficially applied. The choice has been governed by a desire to present forms of disease upon which these beneficial results could be most easily and certainly demonstrated.

An exhaustive treatment of the subject at this time and place will be out of the question. I shall therefore refrain from generalities and place my subject before you in outline only, leaving your good sense and experience with disease to fill in the details.

Hyperemia and congestion of the dental pulp from caries, thermal shock, chemical and mechanical irritants, and traumatic injuries, etc.,

resulting in odontalgia, are among the most common of the diseased conditions found in the oral cavity, and many times the most difficult to control by the methods of treatment usually adopted, without devitalization of the pulp. Hyperemia and congestion of the peridental membrane from constitutional causes, such as rheumatism, gout, and pregnancy, and certain local causes, like excessive malleting, undue wedging, change of position of the teeth in regulating, and other surgical or traumatic injuries, resulting in severe pain, is many times quite as difficult to control.

These forms of disease will best serve our purpose in this attempt to demonstrate the therapeutic value of electric and galvanic currents in the treatment of local disorders of the oral cavity.

The object, of course, in the treatment of these forms of disease is, in the first class, to relieve the congested condition of the blood-vessels and to preserve the vitality of the pulp ; in the other, to arrest the inflammatory symptoms short of the suppurative process or of the formation of adventitious tissue or new growths.

How these much-to-be-desired conditions can be obtained is a question that has often troubled the mind of the thoughtful dentist ; and while I do not claim to have made any new discovery, I am confident that the galvanic current, if judiciously used, will prove to be a valuable aid in the treatment of certain forms of inflammation of the pulp and peridental membrane, and many other conditions which further experience and experiment will demonstrate.

It is a generally-known fact to medical electricians that local hyperemia and anemia can be produced at will by the influence of the negative and positive currents of electricity, and that resorption of certain inflammatory products and new growths can be promoted through their stimulating effect upon the absorbent organs.

It was the knowledge of these facts which led me to investigate the value of the application of these principles to the treatment of congested conditions of the dental pulp and peridental membrane.

The first case upon which I attempted to demonstrate these principles (which will serve as a good illustration) was a tooth in my own mouth, the history of which is as follows : The right first superior bicuspid had been filled with gold at the age of twenty years, but from poor manipulation had been refilled several times during the next fourteen years. Ten years ago the last of these fillings came out, leaving a large disto-approximal cavity, and the pulp nearly exposed. The tooth was exceedingly sensitive to the slightest thermal changes, to acids or sweets ; it was therefore plugged with Hill's stop-

ping. Six years ago this filling was removed with the hope of introducing gold, but the tooth was in such a sensitive condition as to make it unwise to introduce a gold plug ; oxyphosphate cement was therefore substituted. During the following night there were developed marked evidences of a congested condition of the pulp. The next morning the phosphate filling was removed and the cavity dressed with oil of cloves, and a solution of gutta-percha in chloroform was flowed over the bottom of the cavity, which was refilled with oxyphosphate cement. The symptoms, however, did not abate, but gradually increased in severity. I therefore determined to try the depleting effect of the positive galvanic current, and called upon my friend, Dr. Justin Hayes, of Chicago, with the request that this line of treatment might be thoroughly tried. The positive pole of the continuous galvanic current was applied to the tooth, and the negative pole to the carotid triangle of the neck on the same side. The strength of the current was graduated to my ability to bear it without discomfort, and the poles were allowed to remain in position for about half an hour. At the end of ten minutes there was a marked improvement in the symptoms, and at the end of the half-hour all discomfort in the tooth had disappeared. During the following night the tooth again became uneasy, but a second treatment of about twenty minutes the next morning completely relieved it, and from that time on it has caused me no annoyance. Three years ago the tooth was filled with gold, as a clinic by Dr. Roscoe F. Ludwig, at the International Medical Congress held at Washington, D. C. The pulp is still vital, but is no more susceptible to irritating influences than that of any other tooth in my mouth.

The marked success which followed the treatment of this tooth has led me to adopt the same treatment in several similar cases, all but one of which have responded to my entire satisfaction. This case was one in which there was not much hope of the treatment proving successful, yet it was tried as a forlorn hope. The history is briefly as follows : Miss J. E., aged twenty, of frail, delicate organization, fair health, had been under treatment one year previously for protrusion of the superior anterior teeth. The operation had been performed slowly and with great care to avoid serious irritation of the dental tissues and alveolar processes, and the final retaining-plates had been worn for about six months. About this time a slight discoloration near the gum of the right superior central was discovered. She came in great haste to know why this should occur. There had been no pain in the tooth, and there was no soreness to percussion ; it was

slightly sensitive to heat and cold, but this symptom was not so marked as in the adjoining teeth. My diagnosis was either passive congestion of the pulp, induced by the irritation in moving the teeth, or the formation of an embolus in the pulp-vessels. Which it was, I was unable to decide, and as there seemed to be no hope of saving the vitality of the pulp by the ordinary methods of treatment, the positive galvanic current was applied. In the treatment of this case I called in council Dr. Plymon Hayes, of Chicago. On the application of the current to the neighboring teeth, three-fourths of a milliampere was all that could be comfortably borne, while the diseased tooth would bear just double this amount. Daily treatments of twenty minutes each were maintained for a week ; during the first three days there was a slight increase in the sensation of the tooth under the current, and the strength was reduced to one milliampere ; after this, however, sensation seemed to grow gradually less, the current being increased to three milliamperes without unpleasant response. The treatment was therefore abandoned, the tooth tapped, and the pulp removed, and the case treated by the usual methods.

In the treatment of pericementitis not caused by septic poisoning from a devitalized pulp, it is many times of very great benefit. In these cases the positive pole should be applied to the gum over the roots of the affected tooth ; marked relief is often experienced in a few minutes, and often entire relief after three or four applications.

In a former paper* I have called attention to the prevalence of hyperemic odontalgia frequently accompanying pregnancy, as a result of impeded circulation in the lower extremities and thereby causing general hyperemia of the upper half of the body. The general treatment suggested in that class of cases was rest in the recumbent position, and anodynes. I would now suggest as an additional treatment the local application of the positive galvanic current to the affected teeth.

With regard to the strength of the current, experience proves that from three-fourths to one and a half milliamperes is sufficient in the class of cases so far mentioned, while the frequency of the sittings will depend upon the severity of the local symptoms and the nervous susceptibility of the individual.

As a rule, one treatment in twenty-four hours is all that will be required ; in aggravated cases two, and occasionally three, may be ad-

* *Journal American Medical Association*, 1889.

visable, the duration of the sittings being from fifteen to thirty minutes.

As a means of diagnosis in obscure cases of the vitality or non-vitality of the dental pulp, I know of nothing so sure to demonstrate to a positive certainty these conditions as the electrical currents, both the galvanic and the faradic. In the more obscure cases, however, the faradic is superior to the galvanic, for if there is the slightest vitality remaining in the pulp it will demonstrate it instantly by causing a response in the tooth. It is superior in this respect to the transmission of light by the electric mouth-lamp, for many times when the condition is upon the border-line between the life and death of the pulp, the electric light fails to satisfactorily demonstrate the condition.

I also believe that the electric currents will serve to demonstrate the presence of low grades of inflammation of the tooth-pulp, so often the cause of various forms of neuralgic conditions of the face and head. The faradic current especially, if applied in such cases, will demonstrate a hypersensitive condition of the tooth-pulp. In order to locate the tooth causing the neuralgia, it will be necessary to apply the current to each individual tooth. The diseased one will give more active response to the current than will the healthy teeth ; in other words, the diseased tooth will not bear so strong a current as will the healthy ones, hence the importance of using the milliamperemeter for measuring the exact strength of the current.

The value of the current in the treatment of neuralgia, paralysis, atrophy of muscles, chronic indurations, tumors, and various other conditions there is not time to detail. We shall therefore leave the matter here, feeling that we have offered a sufficient number of suggestions to stimulate investigation as to the value of electro-therapeutic treatment in the class of cases which have formed the especial topic of this paper.

The battery, milliamperemeter, and the electrode which I use were made for me by the McIntosh Battery and Optical Company, of Chicago.

DISCUSSION.

Dr. G. J. Friedrichs : I wonder if there is not some mind-cure in that. You may laugh, but there is some truth in my remark that the mind has a great effect on the result of treatment. It will cure sometimes. I had that illustrated in my own case. I have suffered frequently from lumbago. The first time electricity cured it in about the space of two weeks, when by the general course of the disease I would have recovered without any treatment in six weeks. The

second time I was taken, the remedy was applied. It had no effect at all, although I kept it up for at least a month. I believe really it is a good thing, and if I adopted anything that has been presented here, I should apply it to relieve patients whom we cannot relieve otherwise. I should make the attempt, at any rate.

Dr. Abbott : The little instrument that is being passed around that Dr. Marshall has used in his electrical current reminds me that some years ago I made an instrument of a similar kind, only the back end was a bow instead of being held by a little rubber arrangement,—a bow that would spring back and forth, made of brass, silver, or gold ; on the ends of the bow were cups facing each other, the same as these. Each cup would hold about a quarter of an ounce, I should judge ; they were about three-quarters of an inch in diameter and nearly half an inch in depth. The cups I packed with sponge, and saturated each with a mixture of tincture of aconite-root, chloroform, and alcohol, of each one ounce, and to which I added Magendie's solution of morphine, twelve drops. That I used as a local anesthetic for extracting teeth. Saturating the sponges and holding them against the sides of the gum over the tooth for about five minutes, the desired effect is produced.

Dr. G. J. Friedrichs : What is the object of adding alcohol? Aconite is an alcoholic tincture. I find that aconite answers all the purpose.

Dr. Abbott : I give it to you as I have used it for a good many years. You can do as you like with it. Some gentlemen seem to have understood that I use electricity with this preparation, but I do not. I would suggest, however, that electricity would intensify the action of any material of this kind. By making each of those sponges an electrode you can force the remedy deeply into the tissue, and produce the effect desired without the slightest trouble in a very few minutes. That is the common practice with surgeons to-day,—using electrodes for forcing local anesthetics into the tissues. The results are much more satisfactory than they are if absorption is relied upon.

Dr. Horton : My son has invented an apparatus by which he overcomes all sensitiveness in the dentine from excavating preparatory to filling teeth. He is not in the situation to make any illustrations here, but I hope and expect at the next meeting of this society he will be present to show you what he can do. I believe this invention will entirely do away with all medicaments that have been invented or thought of. He will excavate a cavity, whether it is wet or dry, without the slightest pain, in persons of any age.

DR. SHEPARD: I would ask if this has been completed?

DR. HORTON: It has been completed, so that he is using it daily in his practice.

DR. SHEPARD: Over how long a time do the operations extend?

DR. HORTON: He perfected it some time in December, and he has been using it from the first of March when able to be in the office and operate.

DR. SHEPARD: I would like to ask whether any dentist has seen the process?

DR. HORTON: Certainly, and if any reputable dentist comes to Cleveland it will be shown to him.

DR. SHEPARD: Have any Cleveland dentists seen it?

DR. HORTON: I don't know whether they have or not. They have been invited. Some of them have. He has not had it in a situation to be shown. I think Dr. Butler has been invited to come in and see it.

DR. BUTLER: I happen to be from Cleveland, and I claim to be a reputable dentist. Now, if this thing is so valuable as is claimed by our *confrère*, all that I have to say is that it would be an act of common humanity to put it in shape where the profession can have the benefit of it. I do not know of any dentist there that has had an opportunity or has been allowed to see this wonderful process that has been described here this morning. Mere assertion by Dr. Horton does not prove any more in this direction than it would in other lines of scientific investigation.

DR. HORTON: I will say that Dr. Butler has been invited to come and see it. Have you not, doctor?

DR. BUTLER: I will answer that by saying that I have been invited a number of times, but I have never seen anything.

DR. HORTON: My son was confined at home sick in bed with *la grippe* for over four weeks. During that time Dr. Butler called twice on my invitation. As I have not the key to the apparatus, I was unable to show it to the doctor, and explained to him the reason of my son's absence. I have invited the president (Dr. Harlan) of this society to come to our office on his return from Europe, and it will be shown him. And I now extend the invitation to each member of this Association to call at his leisure and see its workings.

DR. HUNT: I would like to ask of the essayist exactly what he means by the use of the term embolus in relation to the deposit in the pulp, whether he means the calcified tissue, or blood-clot, or what?

DR. MARSHALL: I mean by that term just exactly what is gener-

ally understood by it, viz: a clot of blood has plugged up the vessels; that the arterial supply of the pulp had been cut off, probably by the floating into it of some little floccule of fibrin, or perhaps the formation of a blood-clot through the congested condition. In other words, stasis has taken place.

Dr. A. G. Friedrichs: I was pleased with Dr. Marshall's suggestion. We all know that electricity is still in an experimental state, that, as far as our knowledge goes in regard to the use of it,—I speak medically,—there is really no particularly definite data upon which to base its application. I think the suggestion of Dr. Marshall is a very good one. It is far from being demonstrated, because in all these matters it requires a great deal of original investigation to get to a point where it is beyond the experimental state. I do not believe in tabooing anything that has the least show of being productive of good. If these conditions arise, I should certainly try to get some data, so as to either prove or disprove the benefits that might be derived from the use of electricity under the circumstances that Dr. Marshall has spoken of.

Dr. Morgan: I perhaps know less about electricity than any man in this audience. For the last four or five years those of you who have known me know that I have had great difficulty in my locomotion. I am constitutionally rheumatic. I am afraid that I have hereditary gout. A few months ago a gentleman came to me with a little apparatus made of wire with a couple of poles to it, and one end of which he proposed to attach to me: he called it an electropoise. I was walking with a crutch and stick, stepping about fifteen inches at a time, and I had to have both the crutch and cane in order to get across the floor. I was enjoined not to take any medicine. He attached the apparatus to the wall in a little box beside my bed, and connected it to my ankle next to the skin, and a little metallic cylinder, the other pole, was carried down and put in the earth below. In about a week or ten days I began to sleep a little better. The pains, with which I had suffered constantly, began to subside, and in about three months, wearing this appliance every night, that foot began to come up a little. I have worn it almost constantly from that time to the present, and this is the way I travel now. [Stepping across the hall without crutch or cane.] (Applause.) I am free from pain, I sleep like a baby, my digestion is first-rate, and I have no interrupted pulsation of the heart, from which I had suffered since 1867, when my friends all thought I was going to die soon. I am in my seventy-third year, and I believe I am going to renew my youth. When

he put this thing onto me he said, "I am going to make you throw away your crutches; you shall walk without them," and now I can hobble across the floor without them. That is all I know about it; so I regard this thing that you call electricity as very valuable, and although I do not walk very well,—I am not restored in that respect,—I do not know of any valuation that could be put upon it in dollars. I do not know whether I would begin in the thousands or tens of thousands, or where. I give that as an illustration of the value of that material you call electricity. I do not know what force operates this appliance. Our experts at Nashville took it down to our electrical plant there, and they say that no electricity whatever could be discovered, and you cannot feel any current when it is put on; but it does some very wonderful things, under my eye, not only for myself but for two or three others who are very near to me: in one case the healing up of some of the ugliest old ulcers upon the ankle that I ever knew, that were of twenty-five years' standing at least, in seven weeks.

Dr. Abbott: I would like to emphasize what Dr. Morgan has said, so far as a patient's testimony will go. He has had similar results with the same instrument that Dr. Morgan speaks of, and, if anything, even more remarkable. He would not part with that little instrument, which he can carry in his pocket, for any amount of money. I think the man who makes them lives in New York.

Dr. Morgan: He lives in Birmingham, Alabama.

Dr. Shepard: There are extant among intelligent as well as ignorant people such a multitude of testimonies of cures which cannot be accounted for by any recognized laws of medical science or by the use of any known medicament, that we are forced to the conclusion that there is at the bottom of such cures some principle, like mind-influence, which is not yet fully understood. We cannot dismiss these well-authenticated cases with the claim that they are accidents or coincidences. We may accept the extreme theory of direct Divine interference, or the less supernatural one that faith or implicit belief in itself is sufficiently powerful to cause chemical, physiological, or functional changes in the human organism. We know that some of the most intelligent and well-educated people in our communities are firm believers in and practitioners of Christian science and kindred theories, and we must admit that they are not lunatics. The origin of the bread-pill treatment is lost in the mists of antiquity. Everyone has found a pretended medicament as efficacious as a true one when enforced by the positive assurance given to the patient that it is sure to do the desired work, provided the assurer has the character calcu-

lated to carry conviction. There is no reason why we should not take into account these facts and avail ourselves of them in our practice, either in place of a desired medicament, or to augment the efficiency of those we use, feeling assured that we are doing good thereby. And may we not hope with confidence that as a result of patient scientific investigation many things which are now dark will be made clear, and that we are on the threshold of some great truths, which now mislead us from our not understanding them, but which will ere long be so much better understood as to explain the multitude of occult things in medical practice?

DR. TAFT: Dr. Morgan is not that kind of a man. He is not a man who will believe anything and everything that anybody tells him. There must be an appeal to his judgment and reason before he will believe, and I do not think that his assent had anything to do with the influence this apparatus had upon him.

DR. MORGAN: A greater infidel on the subject of all that occult influence that my friend speaks of than I am, does not exist this side of Jordan. When the gentleman who left the instrument at my house went and announced to my friends down-town that he was going to make me throw my crutches away, I thought he was visionary. I have boxed the compass on this subject of medical treatment from Boston to New Orleans, and I have tried electrical baths and electricity in almost every form, and consulted the best medical men without ever receiving any permanent benefit, and I have all my life eschewed everything like quackery, and nostrums in every shape. I had as little confidence in them as any man, but when I know the results, why, there is no use talking. I do not know anything about it. I simply state the facts to show that there is somewhere in that region an agent that we do not yet know how to handle, which will be very valuable.

DR. MARSHALL: This discussion has taken a very wide range, it seems to me, and it would take a long time if I should attempt to answer all the points that have been brought up. A good many of them, by the way, I could not answer to your or my own satisfaction; but Dr. Friedrichs and Dr. Shepard have thrown out the suggestion that perhaps this idea of electricity being beneficial in the treatment of disease is owing to the influence of the mind, or in other words, that it is part of the mind-cure. These gentlemen are not serious certainly when they make that statement, because we know positively that certain forms of tumors in the human body can be reduced by the action of the positive galvanic current. This has been proved hundreds of times, so that point is settled. Its action is to stimulate

the absorbents, and in that way the tumor is carried away. Another fact that has been thoroughly well established that I brought out in my paper, and the one which stimulated me to the test of the question, is the production of hyperemia of the surface of the body by the application of the positive galvanic current, and the reverse of that by the negative current. You can drive the blood out of a part by the current, or you can bring it in. Anybody can test that if he has a battery. Another point : When I first began this treatment I used my index finger as an electrode, having my assistant hold the lip away. I could not leave it upon the tooth more than about five minutes before the current decomposed the water and the secretions under my finger-nail, when it became so painful that I could not bear it. What was the trouble? Acids formed there, caused by the decomposition of the fluid by the electric current. These things we do not understand, but through this influence we get some of the most valuable therapeutic effects of the remedy.

I might have illustrated my paper by citing several cases, but I did not wish to take up your time. I thought if I gave you one successful case it would illustrate the point I wanted to bring out. I will give you one other case. One of the most talented women in Chicago, a physician, who lives on the North Side, had this difficulty : In the excavation of a cavity in a bicuspid tooth by her dentist one of the horns of the pulp was slightly exposed, and he capped and filled it with oxyphosphate ; a few days afterward it began to trouble her. In the first place there was simply that low, grumbling, disagreeable sensation that is often observed as a forerunner of pulpitis. I suggested the use of the positive galvanic current. She said it would not do her any good, that she had no confidence in it. I asked her to let me try it, which she did, and in less than half an hour the tooth was quiet. It went along for several weeks, and she came back and said the tooth was annoying her again, that that morning she took some hot coffee, and since then it had annoyed her. I applied the current three times, one sitting of twenty minutes a day. The tooth is comfortable, and the pulp is still alive. Under ordinary circumstances, if I had let it alone, it would have been dead in three or four days. The value of this treatment is not in cases of pulpitis ; it is only in those cases where you find the first stages of hyperemia, where it will, if let alone, in all probability go on to congestion and death of the pulp. Take it in the first state, and you will relieve the hyperemia and save the pulp.

Dr. Abbott spoke of the introduction of medicaments into the sys-

tem by the galvanic current. There has been a good deal said about that of late years. I have not tried it yet, but before I left home, in a conversation with Dr. McIntosh that matter was brought up, and I said I wanted to try certain remedies, for instance in pericementitis, taking the tinctures of aconite and iodine which we use to abort the disease, applying them with a sponge as Dr. Abbott suggested, and seeing if we could carry that medicament into the tissue so as to bring about a more rapid action. I have some thought that it can be done, and I propose to try it to see what can be accomplished with it.

Dr. Truman : As Secretary of this Section, I would like to introduce Dr. Stebbins, who has his son here, to show the action of nitrate of silver upon decay in deciduous teeth. It strikes me as being valuable, and I would ask him to explain his method.

Dr. Stebbins : I have been requested to detail my manner of procedure in the treatment of decay with nitrate of silver, which I have after much consideration decided upon as a method whereby we may save temporary teeth without cutting or pain, and to illustrate the effects of the treatment by this patient who happens to be with me. I use crystals of nitrate of silver, because there is less impurity in them than in the stick. Nitrate of silver forms a definite compound with albumen and fibrin, which is dissolved in but few substances. The caustic is so very hostile to microbes, that they will not touch the decaying substance of teeth after it has been compounded with the salts, because they do not like it, and keep away. The time to apply it is when the teeth begin to decay. The effect is more satisfactory on buccal and labial surfaces than on other portions of the teeth. You can see this boy's second temporary molars, the two upper ones especially. When he was about four years old he complained of their hurting, so that he could not brush them. I found almost the entire buccal surfaces decayed, presenting a whitish color, and at once made an application of the salts, in March, 1886,—five years ago last March. They have not been treated since, and there has been no further decay.

The approximal cavities in the lower molars were treated in June, 1887, and re-treated in November, 1889. You see the characteristic effects of the silver, and that they have no appearance of active decay now. I have treated many cases, not only in temporary, but also in permanent teeth, and have saved them for years, without any excavating, filling, or cutting, but simply by treating them with the pulverized crystals. I pulverize the crystals in a mortar. The excess of

moisture should be absorbed from the cavity, then a wood point, moistened enough so that the crystals stick to it, should be touched to the pulverized crystals, and the salts thus applied to every part of the decayed portion. Do not be afraid of getting too much in. I have not had any injurious results. It will not affect the teeth at all where they are not decayed. In February and March, 1888, I took a lot of children out of the primary schools and treated their teeth in this manner. In May, 1891, I examined 124 cavities out of those, and I found 87 where the treatment was perfectly successful, and in many mouths where it was tried other parts of the teeth treated had decayed and lost much of their substance, while the portions treated remained intact.

I regret being obliged to present so important a subject in so brief space of time.

DR. CORYDON PALMER : I arise to a question of privilege. I came here strongly impressed with something I wished to say on operative dentistry, and the subject has been cut short. Now I ask it as a privilege that I may be allowed for a short time to say what I wish to say.

[By universal consent the privilege was granted.]

DR. PALMER : The American people as a nation are disgracing themselves by having their mouths packed full of gold. You can hardly go anywhere but you will see mouths with scraggy old teeth, but full of gold. The capping of teeth is being brought more into notice because patients will insist on having the inferior incisors capped all over with gold, which shows all the time they talk. The effect is frightful. I want to urge upon you to study to avoid the fault which produces it. It is a disgrace to our American people, and to our Association, that wherever you go you see persons with their mouths full of gold. It is unnatural, unsightly, and therefore in bad taste. I urge you to try to get along without it.

But what I have been grieved most at is in the treatment of children's teeth. From what has come under my notice, there is not enough knowledge on that subject. Not enough pains is taken to instruct the students, and the dentists themselves even seem to need a great deal of instruction. I walk along the street where I live, and a dear little child, not more than so high, stops me and says, "I have been having my teeth pulled out." Less than three years old,—been to the dentist and had two inferior central incisors extracted! The parents did not know any better. They thought they must do something, and the dentist was so lacking in knowledge that he would even consent to do

that. I have also been shocked and grieved in the colleges. They have a room which is called the infirmary, into which patients are invited to be operated upon by the students. A young mother comes in and brings her little babe which has some teeth that are aching, and they take the child in there and set a raw student to extract those teeth! You do not want to extract children's teeth. There is more harm done by interfering with the deciduous teeth than by all the rest that befalls the mouth. You get deformity and irregularity by it. You must not extract the deciduous teeth, but treat them, take care of them, and keep the little roots until the time comes for them to be removed in natural course.

These two subjects have impressed me so strongly that I felt I must speak upon them here. I hope, gentlemen, that you will exert your influence for good and will endeavor to influence others to not interfere with children's teeth, and when a young mother or any other person brings a child patient to you do not, I beg of you, consent to extract the teeth, for that is wrong. Treat them; they are easily managed. The deciduous teeth will yield to treatment readily. Use some gentle dressing and soothing treatment, and keep them until the proper time for them to be lost.

Dr. Floyd: Before we adjourn I wish to express my gratification with the meeting just closing. I feel that I have here listened to some of the best papers that I have ever heard. I am especially glad that I have been present, because when I look around and see the gray hairs of so many of the members I feel that we may not all of us who are here meet together again. I shall carry back with me to my home a sense of gladness that I was present at this meeting, which in point of interest has been certainly one of the most important ever held by the Association.

CLINICS AT SARATOGA.

Dr. C. A. Timme, of New York, gave a clinic illustrating a method of making porcelain inlays. A low-fusing porcelain is fused into a matrix of pure gold foil, which has been obtained by burnishing No. 60 foil into the cavity with semi-hard rubber points. The powdered porcelain is mixed with distilled water, and by means of a pointed badger's-hair brush carefully laid into the matrix, which is then held in the flame of a gas or an alcohol lamp until the porcelain fuses and entirely fills the cavity of the matrix. After cooling, the gold foil is stripped from the inlay, and it is ready for insertion into the cavity by means of cement. Dr. Timme also applies the porcelain to the faces of all-gold crowns by cutting out the buccal surface and soldering into the inside of the crown, securing thereby a shallow cavity into which the porcelain is baked in the lamp as before. Care must be taken not to use a solder of lower carat than twenty. Dr. Timme recommended a German cement for inserting the inlays.

Dr. V. H. Jackson, of New York, gave a clinic illustrating his method of making the piano-wire "cribs and springs" for regulating teeth. The method is fully described in Dr. Jackson's paper read under Section III.

Dr. Truman W. Brophy operated on a diseased antrum, in which an abscess had formed a year prior to the operation. The antrum had been opened through its anterior wall for the purpose of securing drainage. The first molar tooth was absent,—the one which no doubt gave origin to the disease,—and it was through its former alveolus that a large opening was made. Dr. Brophy, in explaining the case, said,—

"Abscesses of the antrum should be drained at the most dependent part of the cavity, and the point best suited for the opening is, as a rule, at the location of the first molar tooth. It is as impossible to secure perfect antral drainage by making an opening through the anterior wall of the cavity as it would be to place a barrel on its end and expect to completely drain it by drawing the plug from the bung-hole. A platinum tube was made and fixed to a band which was made to fit a tooth adjoining its opening, and it was thus firmly held in place. The patient was directed to plug the end of the tube before

taking food, so as to prevent the passage of food into the antrum. After meals the tube should be kept open that perfect drainage might be effected. Antiseptic solutions and insufflations were prescribed."

Dr. E. A. Stebbins, Shelburne Falls, Mass., described a method of treating dental caries with nitrate of silver. The doctor's idea is an old one, but his method is more systematic than any before advocated. The nitrate of silver is powdered and a small quantity introduced with suitable wood points to the carious cavity, which is previously slightly dried and excavated of loose material, and kept so for a brief period to allow the nitrate of silver to combine chemically with the partly decalcified tooth-tissues, forming a black eschar or insoluble covering, which protects the tooth from any further encroachment of caries. The doctor showed specimens of deciduous teeth he had treated in this way, which had resisted the action of caries for three and four years, while other cavities had appeared on other surfaces, and destroyed a large portion of the same tooth.

APPENDIX.

LIST OF DENTAL SOCIETIES IN THE UNITED STATES.

NATIONAL.

American Dental Association. Geo. H. Cushing, *Secretary*, 96 State st., Chicago.

Post-Graduate Dental Association of the United States. L. S. Tenney, *Secretary*, 96 State st., Chicago.

Dental Protective Association of the United States. J. N. Crouse, *Chairman*, 2231 Prairie ave., Chicago.

Supreme Chapter, Delta Sigma Delta Fraternity. T. A. Broadbent, *Secretary*, 96 State st., Chicago.

INTER-STATE.

Southern Dental Association. H. C. Herring, *Secretary*, Concord, N. C.

Mississippi Valley Association of Dental Surgeons. H. T. Smith, *Secretary*, Cincinnati.

American Academy of Dental Science. Edward N. Harris, *Corresponding Secretary*, No. 2 Park square, Boston.

New England Dental Society. E. O. Kinsman, *Secretary*, 15 Brattle square, Cambridge, Mass.

Southwestern Dental Society. Address, R. I. Pearson, 900 Grand ave., Kansas City.

Connecticut Valley Dental Society. Geo. A. Maxfield, *Secretary*, Holyoke, Mass.

Dental Society of the State of Maryland and the District of Columbia. M. W. Foster, *Secretary*, 9 W. Franklin st., Baltimore.

STATE AND LOCAL.

Alabama.

Alabama State Dental Association. John S. Hill, *Chairman Executive Committee*, Huntsville.

Alaska.

None

Arizona.

None

Arkansas.

Arkansas State Dental Society. L. G. Roberts, *Secretary*, Eureka Springs.

CALIFORNIA.

California State Dental Association. W. Z. King, *Secretary*, San Francisco.
California State Odontological Society. H. J. Plomteaux, *Secretary*, San Francisco.

District Society.

Southern California Odontological Society. E. L. Townsend, *Secretary*, 133½ S. Spring st., Los Angeles.

City Societies.

San Francisco Dental Society. Charles Morffew, *Secretary*, San Francisco.
Los Angeles Dental Association.

COLORADO.

Colorado State Dental Association. W. A. Smith, *Secretary*, Denver.

CONNECTICUT.

Connecticut State Dental Association. Geo. L. Parmele, *Secretary*, Hartford.

DELAWARE.

Delaware State Dental Society. C. R. Jefferis, *Secretary*, 908 King st., Wilmington.

DISTRICT OF COLUMBIA.

Washington City Dental Society. O. Darrell, *Secretary*.
Washington Dental Society. H. M. Schooley, *Secretary*.

FLORIDA.

Florida State Dental Society. J. C. Perine, *Secretary*, Ocala.

GEORGIA.

Georgia State Dental Society. L. D. Carpenter, *Secretary*, 47½ Whitehall st., Atlanta.

IDAHO.

None.

ILLINOIS.

Illinois State Dental Society. Louis Ottofy, *Secretary*, 70 Dearborn st., Chicago.

District Societies.

Northern Illinois Dental Society. T. W. Beckwith, *Secretary*, Sterling.
Southern Illinois Dental Society. W. E. Holland, *Secretary*, Jerseyville.
Eastern Illinois Dental Society. Geo. H. Damron, *Secretary*, Arcola.
Western Illinois Dental Society. W. O. Butler, *Secretary*, La Harpe.

City Societies.

Chicago Dental Society. L. L. Davis, *Secretary*, 524 W. Van Buren st.
Chicago Dental Club. A. E. Baldwin, *Secretary*, 828 W. Adams st.
Odontological Society of Chicago. E. Noyes, *Secretary*, 65 Randolph st.

Odontographic Society of Chicago. R. B. Tuller, *Secretary*, 946 W. Madison st.

Hayden Dental Society of Chicago. J. O. Brown, *Secretary*, 6301 Yale st.

Quincy Dental Society. A. R. Gardner, *Secretary*.

INDIAN TERRITORY.

None.

INDIANA.

Indiana State Dental Association. R. W. VanValzah, *Secretary*, Terre Haute.

City Societies.

Odontological Society of Indianapolis.

The Isaac Knapp Dental Coterie of Fort Wayne. M. A Mason, *Secretary*.

IOWA.

Iowa State Dental Society. Geo. W. Miller, *Secretary*, Des Moines.

Eastern Iowa Dental Association. E. L. Brooks, Secretary, Vinton.

KANSAS.

Kansas State Dental Association. C. E. Esterly, *Secretary*, Lawrence.

KENTUCKY.

Kentucky State Dental Association. J. H. Baldwin, *Secretary*, 609 W. Chestnut st., Louisville.

LOUISIANA.

Louisiana State Dental Society. J. G. McCulloch, *Secretary*, 357 Dryades st., New Orleans.

New Orleans Odontological Society. J. Paul Bayon, *Secretary*, 125 Bourbon st.

MAINE.

Maine Dental Society. E. C. Bryant, *Secretary*, Pittsfield.

MARYLAND.

Maryland State Dental Association. D. F. Pennington, *Secretary*, 1087 W. Fayette st., Baltimore.

MASSACHUSETTS.

Massachusetts Dental Society. E. O. Kinsman, *Secretary*, 15 Brattle square, Cambridge.

City Societies.

Harvard Odontological Society. Chas. H. Taft, *Corresponding Secretary*, Cambridge.

Boston Society for Dental Improvement.

Worcester Dental Society.

MICHIGAN

Michigan State Dental Association. Dr. House, *Secretary*, Grand Rapids.

Detroit Dental Society. F. M. Thompson, *Secretary*, 13 Alexandria ave., W.

MINNESOTA.

Minnesota State Dental Association. L. D. Leonard, *Secretary*, 73 Syndicate Block, Minneapolis.

Southern Minnesota Dental Society. H. L. Cruttenden, *Secretary*, Northfield.

Minneapolis Dental Society. E. F. Clark, *Secretary*.

MISSISSIPPI.

Mississippi State Dental Association. T. C. West, *Corresponding Secretary*, Natchez.

MISSOURI.

Missouri State Dental Association. John G. Harper, *Secretary*, 800 Olive st., St. Louis.

St. Lonis Dental Society. Walter M. Bartlett, *Secretary*, St. Louis.

Kansas City Dental Club. R. R. Buchanan, *Secretary*.

MONTANA.

None.

NEBRASKA.

Nebraska State Dental Society. I. W. Funck, *Secretary*, Beatrice.

NEVADA.

None.

NEW HAMPSHIRE.

New Hampshire Dental Society. Edward B. Davis, *Secretary*, Concord.

NEW JERSEY.

New Jersey State Dental Society. Chas. A. Meeker, *Secretary*, 29 Fulton st., Newark.

Central Dental Association of Northern New Jersey. S. S. Hawley, *Secretary*, Newark.

NEW MEXICO.

None.

NEW YORK.

Dental Society of the State of New York. Charles S. Butler, *Secretary*, 680 Main st., Buffalo.

District Societies.

First District Dental Society. B. C. Nash, *Secretary*, 113 W. Seventy-eighth st., New York city.

Second District Dental Society. John J. Pitts, *Secretary*, Clinton and Atlantic, Brooklyn.

Third District Dental Society. F. Le Grand Ames, *Secretary*, 63 Washington ave., Albany.

Fourth District Dental Society. A. C. Rich, *Secretary*, Saratoga Springs.

Fifth District Dental Society. A. A. Stillman, *Secretary*, 15 E. Jefferson st., Syracuse.

Sixth District Dental Society. T. B. Fuller, *Secretary*, Binghamton.

Seventh District Dental Society. Chas. T. Howard, *Secretary*, 522 Powers Building, Rochester.

Eighth District Dental Society. W. A. Barrows, *Secretary*, 39 Court st., Buffalo.

City Societies.

New York Odontological Society. S. F. Howland, *Secretary*, New York city.

Brooklyn Dental Society. Lewis Shaw, *Secretary*.

Stomatological Club of Buffalo. H. A. Birdsall, *Secretary*, 608 Main st.

NORTH CAROLINA.

North Carolina State Dental Association. C. A. Rominger, *Secretary*, Reidsville.

NORTH DAKOTA.

North Dakota State Dental Society. S. J. Hill, *President*, Fargo.

OHIO.

Ohio State Dental Society. Otto Arnold, *Secretary*, Columbus.

District Societies.

Northern Ohio Dental Association. Henry Barnes, *Secretary*, Cleveland.

Ohio Valley Dental Association. F. S. Maxwell, *Secretary*, Steubenville.

City Societies.

Odontological Society of Cincinnati. W. M. Williams, *Secretary*, 141 Garfield Place.

Cleveland Dental Society. Martha J. Robinson, *Secretary*, 29 Euclid ave.

OKLAHOMA.

None.

OREGON.

A society is about to be organized at Portland. Address W. R. Cox, 203½ First st., Portland.

PENNSYLVANIA.

Pennsylvania State Dental Society. H. Newton Young, *Corresponding Secretary*, Wilkes-Barre.

Odontological Society of Pennsylvania.

Pennsylvania Association of Dental Surgeons. Theodore F. Chupein, *Secretary*, Philadelphia.

District Societies.

Susquehanna Dental Association. V. S. Jones, *Secretary*, Bethlehem.

Lebanon Valley Dental Association. C. R. Scholl, *Corresponding Secretary*, Reading.

County Society.

Philadelphia County Dental Society. Chas. E. Graves, *Secretary*, 715 N. Forty-first st., Philadelphia.

City Societies.

Pittsburgh Dental Society. M. L. Reinecke, *Secretary.*
Odontological Society of Pittsburgh. W. H. Fundenburg, 958 Penn ave.

RHODE ISLAND.

Rhode Island Dental Society, C. A. Brackett, *Secretary*, Newport.

SOUTH CAROLINA.

South Carolina State Dental Association. Louis P. Dotterer, *Secretary*, 74 Wentworth st., Charleston.

SOUTH DAKOTA.

South Dakota State Dental Society. O. M. Huestis, *Secretary*, Aberdeen.

TENNESSEE.

Tennessee Dental Association. P. D. Houston, *Secretary*, Lewisburg.

District Society.

East Tennessee Dental Association.

TEXAS.

Texas State Dental Association. Chas. B. Lewis, *Secretary*, Dallas.

UTAH.

None.

VERMONT.

Vermont State Dental Society. Thos. E. Mound, *Secretary*, Rutland.

VIRGINIA.

Virginia State Dental Association. L. M. Cowardin, *Secretary*, Richmond.

WASHINGTON.

Washington State Dental Association. W. F. Giddings, *President*, Seattle.
Seattle Dental Society. J. C. Grasse, *President*, Seattle.
Tacoma Dental Society. A. McCulley, *Secretary*, Tacoma.

WEST VIRGINIA.

None.

WISCONSIN.

Wisconsin State Dental Society. Claude A. Southwell, *Secretary*, 411 National ave., Milwaukee.

WYOMING.

None.

SUMMARY.

National	4
Inter-State	7
State	41
District and Local	22
City	29
Total	103

The above list is compiled and published by Section II of the American Dental Association. All dental societies having a membership of five or more, and which have adopted substantially the same Code of Ethics governing the conduct of members of the American Dental Association, are entitled to send one delegate for every five members of their society.

The list of societies is as correct and complete as it was possible to make it. Secretaries of societies should make it a rule to notify the Secretary of the American Dental Association (Dr. Geo. H. Cushing, 96 State st., Chicago) of changes in the list of officers, time of meeting, etc.

Anyone will confer a favor by notifying either of the undersigned of any errors or omissions.

J. N. Crouse,
Chairman Executive Committee,
2231 Prairie ave., Chicago.

Louis Ottofy,
Secretary Section II, A. D. A.,
70 Dearborn st., Chicago.

STANDING RESOLUTIONS.

The following standing resolutions are in force at this time, August, 1892 :

Resolved, That henceforth no person shall be received as a delegate who is in arrears for dues, or until he has paid to the Treasurer the full amount due at the time his name was dropped for non-payment.

Adopted August, 1874.

Resolved, That hereafter no dental college shall be entitled to representation in this Association that does not require a good English education as a preliminary qualification for its matriculants, to be ascertained by examination

Adopted August, 1879.

Resolved, That in order to secure representation in this Association, dental colleges must, subsequent to October, 1881, require all students entering therein to take two full courses of lectures previous to coming forward for examination and graduation, and must also state these conditions in their next annual announcement.

Adopted August, 1880.

Resolved, That hereafter no society shall be entitled to representation in this Association that does not require its members to live up to the requirements of our Code of Ethics.

Resolved, When it comes to the knowledge of the Committee on Credentials that any applicant for membership is violating our Code, said applicant shall not be received, and all such applicants shall be referred by the Committee to the societies whose delegates they are, and in no case shall this Association be compelled to treat with violations of the Code, except where the violator is a member of this body and has no membership in any local society.

Adopted 1881.

Resolved, That the Secretary be instructed to assign members, who may neglect to make their own choice, the Section in which they are expected to work.

Adopted 1879.

Resolved, That the reports of Sections shall be called by the President in consecutive order, beginning each succeeding year one number higher than on the preceding year.

1879	commencing with	No. I.	1887	commencing with	No. II.
1880	"	" No. II.	1888	"	" No. III.
1881	"	" No. III.	1889	"	" No. IV.
1882	"	" No. IV.	1890	"	" No. V.
1883	"	" No. V.	1891	"	" No. VI.
1884	"	" No. VI.	1892	"	" No. VII.
1885	"	" No. VII.	1893	"	" No. I.
1886	"	" No. I.	1894	"	" No. II.

Adopted 1879.

Resolved, That a paper presented to the Committee on Voluntary Essays and by them considered and returned to the writer with notification that the said paper is not accepted, cannot afterward be read before the Association unless it is made the special order by resolution adopted.

Adopted 1885.

It shall be the duty of the Executive Committee of the Association to provide at the opening of each annual meeting a book for the registration of members or visitors as they arrive, which shall also give place of residence and hotel where each may be found.

Adopted 1886.

Resolved, That in the future this Association discountenance the giving of banquets, excursions, entertainments, etc., by local professional societies or individuals, either during or at the close of our annual meetings.

Adopted 1886.

Resolved, That it shall be the duty of the Chairman of the Credentials Committee to procure and keep a book wherein each delegate who wishes to be considered a permanent member of this Association shall enter his name.

Adopted 1886.

Resolved, That any member of the dental profession who has been in reputable practice for a period of fifty years may be elected to permanent membership in this Association without the payment of dues ; and any member of this Association who has been in practice for a like period shall have his dues remitted thereafter by presenting the fact to the Treasurer of the Association.

Adopted 1889.

WHEREAS, The National Association of Dental Faculties has passed a resolution adopting a three years' course of instruction after matriculation as essential to graduation ; therefore

Resolved, That in the future no dental college shall be represented in this Association that does not comply with the course of instruction adopted by the college association named.

Adopted 1889.

Resolved, That this Association now in session direct that Sections belonging thereto shall in the future be prohibited from inviting individuals who are

violating the Code of Ethics to hold clinics or to give other exhibitions before this body.

Adopted 1891.

Resolved, That a permanent Standing Committee on Necrology be appointed, to consist of five members, whose duty it shall be to act, without further instruction from this body, as occasion may require, and report to the annual meeting of the Association.

Adopted 1891.